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# POLLUTION OF THE NAVIGABLE WATERS OF THE DETROIT RIVER AND LAKE ERIE AND THEIR TRIBUTARIES WITHIN THE STATE OF MICHIGAN. SESSION (1ST) HELD AT DETROIT, MICHIGAN ON MARCH 27-28, 1962. VOLUME II, PART 1. TRANSCRIPT OF CONFERENCE

Public Health Service
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28 March 1962

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U. S. DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

PUBLIC HEALTH SERVICE

# JOINT FEDERAL-STATE OF MICHIGAN CONFERENCE
ON
POLLUTION OF NAVIGABLE WATERS OF THE
DETROIT RIVER, LAKE ERIE, AND THEIR
TRIBUTARIES WITHIN THE STATE OF MICHIGAN

First Session
Wednesday, March 28, 1962

Banquet Hall, Veterans Memorial Building
Detroit, Michigan

Volume II - Part 1

Pages 178 through 515

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## PROCEEDINGS

The Conference in the Matter of Pollution of the Navigable Waters of the Detroit River and its Tributaries within the State of Michigan, and Lake Erie and its tributaries within the State of Michigan, reconvened at 9 a.m., Eastern Standard Time, March 28, 1962, Banquet Hall, Veteran's Memorial Building, Detroit, Michigan.

PRESIDING:

Mr. Murray Stein, Chief, Enforcement Branch, Water Supply and Pollution Control, Public Health Service, Department of Health, Education, and Welfare, Washington, 25, D. C.

PRESENT:

Mr. Murray Stein, Chief, Enforcement Branch, Water Supply and Pollution Control, Public Health Service, Department of Health, Education, and Welfare, Washington 25, D. C.

MICHIGAN WATER RESOURCES COMMISSION

Albert E. Heustis, M.D., Chairman, State Health Commissioner.

Gerald E. Eddy, Director of Conservation.

George F. Liddle, Muskegon, Municipal Groups.

James S. Gilmore, Jr., Kalamazoo, Industrial Management Groups.

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE

H. W. Poston, Regional Program Director,
Water Supply and Pollution Control, Public
Health Service, Region V, 433 West Van Buren
Street, Chicago 7, Illinois

- - -

THE CHAIRMAN: May we reconvene. This is a continuation of the hearings in the matter of pollution of waters of the United States in Lake St. Clair, the Detroit River, and Western Lake Erie in the Detroit Area.

At this point we will call on Dr. Heustis, of the Health Department of the State of Michigan. Dr. Heustis.

DR. HEUSTIS: Mr. Stein, and gentlemen, and ladies, too. I am very happy to accept the assignment to present to the conference the statement of the State of Michigan and its invited participants. I would ask that you, Mr. Stein, convey on our behalf to the Secretary of the Department of Health, Education, and Welfare, our sincere appreciation for allowing us to seat as conferees Mr. James Gilmore, representing Industrial Management, on the far right; Mr. George Liddle, beside me, representing the municipalities; Mr. Gerald Eddy, the Director of the Municipal Department of Conservation, at Mr. Stein's right, and myself. We realize very well that this is a greater number of State conferees than has been the practice in past procedures such as this, and we do appreciate the kindness of the Secretary in allowing us to have the representation we believed important.

Mr. Stein, to show our appreciation of this, and in order not to complicate the recommendation process, I propose to recommend to my colleagues that we State conferees jointly cast but one vote at the time of the making of the recommendations, thus granting a clear majority to the Federal representatives. The State representatives were impressed by the report presented yesterday by the Public Health Service, and while we reserve the full right to disagree, we would compliment them on the job which they did in so short a time.

We appreciate too the remarks of some of the other Federal representatives, and we are tolerant of the remarks made by others. We are certainly looking to the United States Attorney's office to carry out the legal responsibilities which it has under other statutes in cooperation with other Federal agencies. However, for the moment, speaking of tolerance and asking questions, Mr. Stein, I wonder if I may trouble you for a glass of water?

THE CHAIRMAN: Surely. While you are doing this, we hope we won't have a vote at the end of this. We hope we can get a consensus.

DR. HEUSTIS: Real fine water. Only one thing, Mr. Stein. The thing is every time I drink this fine Detroit water my heart goes out to all of the kids in this vast metropolitan area that are deprived of the benefits of fluoridation and the wonderful public health benefits in preventing cavities in teeth. I would think maybe we might under somewhat different circumstances look forward in the future to the continued help of the Public Health Service and helping our friends in Detroit and the metropolitan area just to accomplish this wonderful public health protection matter.

As I have discussed with the Chairman, I would propose a slight modification of yesterday's procedure. We have a lot of material to present, and so do our invitees. All of the material that will be presented today is in written form. We would propose then as each witness is called upon, to place his written testimony in the record just as though he had read it. We would propose further that if the individuals concerned have an opportunity to informally present oral testimony, that this oral testimony be not made a part of the written record, unless it is specifically requested by the witness, and only such parts as may be specifically requested by the witness will be made parts of the written record. In this way, first of all, should there be any discrepancy the Chairman and I have agreed, between what is said orally and what is in writing, the written record will prevail. By this method we would hope to present a great amount of material and would hope to discourage the reading of long statements.

My proposal, which is made with the Water Resources Commission of Michigan is made in view of my feeling that everyone is entitled to place everything they wish in the record but very little good is gained by anyone repeating what has been said before. Yet, by the fact that their statement may be placed in the written record, which Mr. Stein assured me will be printed, and which each one of the conferees will thoroughly consider before arriving at any recommendation, we feel that this will give them an opportunity to be heard and at the same time might cut down on our time a little bit today.

If this procedure is agreeable, as I have been assured it will be, the State's first presentation will be a combined report of the Michigan Water Resources Commission and the Michigan Department of Health. This report will be presented by several persons who will be introduced by Mr. Loring Oeming, the Chief Engineer of the Water Resources Commission, who will also introduce the report.

I would request, Mr. Stein, as was done yesterday, that the full report be placed before us before any questions or comments are entertained, and I would hereby place in the official record of this proceeding a copy of the report which, if you do not have it in front of you, you should have it in a minute, with all of the maps, and all of the maps that will be used this morning. Here are the copies for the conferees.

I would also announce to those present that at the conclusion of the State's report, within the numbers available, within the numbers we have with us, the copies of this report will be available, and if any members of the press should come in, of course, they may have a copy of the report as we go along.

Mr. Oeming, will you begin?

STATEMENT OF LORING F. OEMING, CHIEF
ENGINEER, WATER RESOURCES COMMISSION,
STATE OF MICHIGAN

MR. OEMING: Dr. Heustis, Chairman Stein, conferees, and ladies and gentlemen.

My name is Loring F. Oeming. I am the Chief Engineer for the Michigan Water Resources Commission. As Dr. Heustis pointed out, we have placed before you this morning a report which is the result of a joint effort by the employed staffs of the Water Resources Commission and the Michigan Department of Health. This report is entitled, "Water Pollution Control in the River Basins of the Southeastern Michigan Region" and is dated March 1962. The report contains information on the municipal sewage and industrial waste disposal situation in Lake St. Clair, the Detroit River, upper Lake Erie, and in the river basins tributary to these waters. It delineates accomplishments in controlling pollution and measures being taken to provide improved control. It also defines the needs to effect further improvement in the condition of these waters.

The report was prepared for presentation to the conferees at the Federal conference called by the Secretary of Health, Education, and Welfare for their consideration and appraisal in arriving at conclusions as to the adequacy of measures taken toward abatement of pollution and in determining the nature of delays, if any, being encountered in abating pollution.

The area encompassed by the report includes all of the drainage basins of the Clinton, Rouge, Huron and Raisin Rivers and the shoreline area of Lake St. Clair, Detroit River and Lake Erie within Michigan which drains directly or through minor tributaries to these bodies of water.

All sources of municipal sewage and industrial waste discharges to these waters are covered. The nature of waste treatment or control measures in effect are described and the state agency action to control pollution is related.

The files and records of the Michigan Department of Health and Michigan Water Resources Commission are the sources of information contained in the report. The employed staffs of both agencies collaborated in assembling the material and in preparing the report.

The report is divided into four main headings, first, the statutory authority, policies and procedures; Chapter II municipal sewage collection and treatment; III industrial waste treatment and control; and IV, the accomplishments and the work to be done.

Chapter I discusses state laws available to control pollution and the relationships that exist between the several agencies of the state in administering these laws. A resume of the contents of this chapter will be given by Mr. Adams, the Executive Secretary of the Commission.

Chapter II gives detailed information on the types and extent of the sewer systems; the disposal and treatment methods in effect at all governmental units within the region. It presents the opinions of the staff of the two state agencies and the adequacy of the systems and methods of disposal or treatment in preventing unlawful pollution as defined in the state statutes. The contents of this chapter, together with the applicable portions in Chapter IV will be presented by J. E. Vogt and Donald Pierce of the Michigan Department of Health.

Chapter III identifies each of the sources of industrial waste discharges to the water courses in all of the river basins involved. It discusses in general terms the principal waste constituents and the methods of control or treatment in effect; the types of action taken by the Water Resources Commission and its predecessor, the Stream Control Commission, to obtain control. It shows the rating assigned to each at the present time.

I will conclude the presentation of the report with a review of the contents of Chapter III, together with the applicable portions of Chapter IV.

As an aid in visualizing the area covered by the report we have prepared a series of orientation maps which will be referred to in briefing these chapters of the report.

At this time I would like to take a minute to run through these maps and to familiarize you with them. The base orientation map is the one entitled "Municipal Sewage Disposal in the River Basins of Southeastern Michigan." This map shows the outline of all the drainage basins referred to in the report. The outline is shown in orange with red dots and it encircles the drainage basins of the Clinton, the Rouge, the Huron, and the Raisin Rivers.

In addition, this map shows the location of all of the incorporated municipalities lying within the drainage basins outlined here. A legend is shown on this map which describes the degree of treatment, the degree of collection, and treatment of the municipal sewage in these municipalities. The municipalities shown shaded in brown have no sewer system and no formal treatment. The municipalities colored in green all have primary treatment. That is in the City of Detroit, which is colored green, there is a primary treatment plant.

Now to show the municipalities connected to Detroit, or in the case of the Wayne County plants at Trenton and Wyandotte we have shaded those tributary municipalities in green, shading from the northeast to the northwest for the Detroit system, and from the northwest to the northeast for the Wayne County system.

The municipalities tinted in pink all provide secondary treatment. Here again we have shaded the tributary municipalities, showing whether they go to the Wayne County system or to nearby township or city plants.

This map also shows the course of the St. Clair River as it comes down into Lake St. Clair, and the outline of Lake St. Clair and the Michigan shore of Lake St. Clair, and the Detroit River and its discharge into Lake Erie, and it goes down to the Michigan-Ohio line.

We have taken the large map, the base orientation map, and have enlarged each of the river basins in the total area of southeastern Michigan. This is another consideration here. I think to shorten this up I would just refer to one of these. They are all of the same nature. Here again we have used the same key to show the degree of treatment provided and whether there is a sewer system or not, but we have also added the location of all of the industries which discharge to the water courses within the river basin.

In the case of the River Rouge basin we have listed 19 industries and with numbers preceding the name of the industrial establishment, and that is keyed in to the location on the basin map so that where the red arrows appear on the basin map with the number this would designate the location of a specific industry. In each of these maps the same procedure has been followed. All of the industries are listed on the map with numbers, and the arrows are placed on the rivers and water courses to show where they discharge into the water course.

I think with that, Mr. Chairman, and conferees, I would like to ask Mr. Adams to brief you on Chapter I of the report.

THE CHAIRMAN: Thank you. At this point I would like to indicate and state that there is one thing we cannot do, I believe, which is reproduce these maps in color. If I can go off the record here.

(Discussion off the record.)

THE CHAIRMAN: On the record. Dr. Heustis.

DR. HEUSTIS: Mr. Adams.

## STATEMENT OF MILTON P. ADAMS, EXECUTIVE SECRETARY, MICHIGAN WATER RESOURCES COMMISSION

**MR. ADAMS:**

## CHAPTER I

### Statutory Authority, Policies and Procedures

### Statutory Authority

Michigan's legislative effort to control water pollution started nearly 100 years ago. The result is summarized below:

1. Act 350, P.O. 1865---Conservation Department
2. Act 98, P.A. 1913----Health Department
3. Act 17, P.A. 1921----Conservation Department
4. Act 245, P.A. 1929---Stream Control Commission
5. Act 61, P.A. 1939----State Supervisor of Wells (Conservation Department)
6. Act 117, P.A. 1949, amending (4) above---Water Resources Commission
7. Act 219, P.A. 1949, amending (2) above---State Health Commissioner
8. Act 40, P.A. 1956 (Drain Code)---------County Drain Commissioners or Intercounty Drainage Boards
9. Act 306, P.A. 1927, as amended-----------County Health Departments

No. 1 was enacted for the protection of fish and fisheries.

No. 2 initiated Health Department supervision of municipal water and sewerage facilities and related developments concerned with public health.

No. 3. The basic Act creating the Conservation Department. This carries a broad grant of authority in the following words found in Section 3: "to prevent and guard against the pollution of lakes and streams within the state, and to enforce all laws provided for that purpose with all authority granted by law."

No. 4. The Legislature's attempt to resolve Health and Conservation Department differences of the late 1920's by the creation of a Stream Control Commission. The Act also provided for compliance under a formal notice, hearing, and order procedure. Unlawful pollution was defined as the discharge to waters of the state as "any waste or pollution of any kind that will tend to destroy fish life or be injurious to public health."

Section 12 of the new Act provided that it should be construed "as ancillary to and supplementing" existing provisions of law governing pollution of lakes and streams "except as the same may be in direct conflict herewith."

The Commission was further required to ascertain in taking appropriate action whether the conditions created were "unreasonable and against public interest in view of the existing conditions in any lake, river, stream or other waters of the state."

Monthly meetings were required of the five member Commission to consist of the Director of Conservation, Commissioner of Health, the Highway Commissioner, the Commissioner of Agriculture and the Attorney General.

No. 5. This enactment made the Director of Conservation the State Supervisor of Wells (for oil and gas). Among his other duties he was authorized "to prevent waste or damage to oil and gas, the fresh, brine and mineral waters or to life and property."

No. 6. A Water Resources Commission of seven members was created to replace the Stream Control Commission of 1929. To make up its membership of seven, there was added to the four hold-over ex-officio members heading the Health, Conservation, Agriculture and Highway Departments, three Executive appointees (with Senate approval). The citizen members represent respectively, Industrial Managements, Municipalities and Organized Conservation Groups.

The preservation and encouragement of member departmental activity in this field was continued as was authority to call upon "any officer,board, department, school, university or other state institution for any assistance deemed necessary to the carrying out of this Act.

The Commission's responsibility is further defined by Attorney General's Opinion No. 1056 of September 28, 1949 holding that "the Water Resources Commission does not have sole and exclusive jurisdiction in all matters pertaining to the pollution of waters of the state, including drains."

No. 7. The last of a series of amendments to (2) above strengthened the Health Department's control of plans, construction, operation and supervision of public water supply, sewerage and sewage treatment facilities. From the standpoint of water pollution control one sentence of the Act is particularly significant: "The State Health Commissioner shall exercise due care to see that sewerage systems are properly planned, constructed and operated so as to prevent unlawful pollution of the streams, lakes and other water resources of the state."

Authorization "to act as agent to the Stream Control Commission on request" appears in Section 11 of the Act.

No. 8. The Drainage Code, up for further amendments each year, carries in Section 423 its definition of the unlawful use of county drains and intercounty drainage facilities for the carrying of sewage and other wastes. Action under this law has been the least productive of pollution control results of all other efforts.

No. 9. The basic Act providing for the establishment of county and district health departments authorizes the County Board of Health to exercise the same powers as conferred on boards of health of townships, villages and cities. On this basis the local health departments in the area have adopted and enforce county regulations controlling the installation and operation of private sewage disposal systems.

## Policies and Procedures

Administration of the water pollution control function in Michigan necessarily follows the division of statutory responsibility previously indicated subject to intercorrelation, wherever possible, of member department interests and objectives with those of the Commission.

While the State Health Commissioner and Water Resources Commission and their respective supporting staffs carry the principal burden of water pollution control, this section will attempt to list the activities of all member agencies in this field including pertinent interrelationships.

### The Water Resources Commission

1. Fosters the policy of each member agency as well as local governmental units and industries doing their utmost to so control waste substances as to prevent unlawful pollution as defined in Act 245, P.A. 1929, as amended.

2. Receives complaints of pollution and acts on reported findings.

3. Receives statements for new or increased use

of waters of the state for waste disposal and acts on Order restrictions recommended by staff, except in case of municipal or other uses solely involving public health where the Commission relies on Health Department action.

4. Schedules and conducts preliminary information conferences as well as conferences "to show cause."

5. Orders preparation and adopts Notice of Determination and Hearing for problems not corrected or correctible through staff approach and effort; takes like action where necessary and when requested to support a member agency's efforts.

6. Holds Statutory Hearings on proposed Orders.

7. Adopts Final Order setting date for compliance following date for submission of plans for approval:

   (a) to State Health Commissioner for municipal sewage treatment.

   (b) to Chief Engineer, Water Resources Commission, for industrial waste treatment.

8. Takes appropriate action on staff reports of failure to comply with previously adopted Orders by declaring default and referring problem to Attorney General for enforcement.

9. Passes on budget requests and proposed staff programs following legislative appropriation (with or without Federal program grant funds).

10. Determines priority of one eligible municipal project over another to qualify for Federal construction grant assistance.

11. Contributes toward the State's share of the U.S. Geological Survey program for stream gaging and lake level records.

12. Contracts with universities for conduct of research projects involving water resource evaluation.

Water Resources Commission Staff (Pollution Control)

1. Conducts field investigations to secure basic information and evidence, which includes pollution surveys to evaluate magnitude and extent of pollution problems.

2. Explores and evaluates polluting effects of wastes from new types of industries.

3. Receives and processes statements of new or increased use of waters of the state for waste disposal purposes, conducts related investigations and recommends appropriate waste restrictions to the Commission.

4. Investigates pollution complaints and reported fish or wildfowl mortalities.

5. Develops recommendations on necessary degree of treatment or time for compliance upon request of Commission.

6. Reviews and approves or rejects plans for industrial waste treatment or control facilities.

7. Makes regular inspections and performance surveys on existing industrial waste control facilities.

8. Counsels with management on industrial waste treatment or disposal problems.

9. Reviews and takes appropriate action on basis of industrial waste treatment plant operating reports.

10. Acts on matters referred from the Michigan Department of Health.

11. Performs work required in carrying out State functions under provisions of the Federal Water Pollution Control Act.

12. Cooperates with Federal and other State agencies in matters related to water pollution.

13. Provides Department of Conservation with stream survey information that might affect future fish plantings.

14. Represents the State's or Agency's interests at conferences and on committees concerned with water pollution and water resource matters.

15. Chief Engineer represents the interests of the Commission on the Advisory Board to the International Joint Commission.

16. Patrols the entire Detroit River and the lower Rouge River. This program was initiated in August, 1960 and has been continued on a routine basis since that time.

During the summer months, patrols are made twice weekly as well as immediately following storms which produce surface runoff. During the colder months, when the need for protection of migratory waterfowl becomes critical, patrol frequency is increased to every other day. As long as weather permits, patrols are made by means of a radio-equipped powerboat. At other times, observations are limited to those made by automobile at vantage points along the shore. Airplane patrols are relied upon to supplement shore patrols and for making emergency inspections when time is a critical factor.

Patrol personnel keeps a log of all observations and copies are later distributed to the Departments of Health and Conservation. Observations of unusual or objectionable waste discharges or river conditions are reported immediately by radio or telephone to Water Resources Commission District Headquarters at Pointe Mouillee and the District Engineer in turn contacts the offender and initiates whatever follow-up investigation may be indicated.

As of March 1, 1962 the patrol program had been in operation for nineteen months during which time a total of 187 patrols were made. Following is a summary by years, of the number of patrols made by boat, automobile or airplane:

| | Boat | Automobile | Airplane | Total |
|---|---|---|---|---|
| Aug. 1, 1960 - Dec. 31, 1960 | 49 | 1 | 2 | 52 |
| Jan. 1, 1961 - Dec. 22, 1961 | 108 | 13 | 1 | 122 |
| Jan. 1, 1962 - Mar. 1, 1962 | | 11 | 2 | 13 |

The number of pollution incidents found and corrected during this period total 112.

State Health Commissioner (Member)
and
Division of Engineering, Michigan Department of Health,
Section of Sewerage and Sewage Treatment
(Water Pollution Control):

1. Reviews, approves or rejects plans submitted for new municipal systems or changes in existing ones.

2. As agent for the Commission, reviews, approves or rejects plans submitted for all new sewerage systems or changes in existing ones, other than municipal.

3. Issues or withholds issuance of construction permits.

4. Counsels with officials of municipalities as to the collection and treatment of sewage. This activity is supplemented and strengthened by programs of local health departments to control the installation of private sewage disposal systems.

5. Consults, confers with and assists staff of Water Resources Commission in all phases of activities related

sewage treatment.

6. Conducts an educational program to foster and encourage the construction, utilization and effective management of adequate sewage collection and treatment works.

7. Conducts inspections to determine that construction conforms to approved plans.

8. Makes periodic inspections and exercises general supervisory control over plant personnel to assure effective operation of sewerage works at municipalities, institutions, trailer parks, schools and hospitals.

9. Trains and certifies the competency of sewage plant operators.

10. Reviews and takes appropriate action on basis of monthly plant operating reports.

11. With aid of mobile laboratory (furnished and operated in part by Federal funds) conducts on-the-site municipal plant performance evaluations.

12. Orders changes in physical facilities or their operation to assure that sewage shall not be "potentially prejudicial to the public health."

13. Reports to Commission when municipal facility has been completed substantially in accordance with approved plans and specifications.

14. Refers appropriate cases to Water Resources Commission for action.

15. Director, Division of Engineering, represents the interests of the State Health Commissioner on the Advisory Board to the International Joint Commission.

## Director of Conservation (Member)

## and

## Department of Conservation (Water Pollution)

Following organization of employed staff of Stream Control Commission late in 1930, this Department withdrew from its former active participation in general pollution control activity except as follows:

1. Its Law Enforcement Division presses occasional attempts to secure convictions under Act 350, P.A. 1865.
2. It organizes and has conducted active oil field patrol and developed highly effective means of brine conservation and oil pollution prevention since 1939.
3. Conservation Officer field assistance has continued to support Water Resources Commission staff efforts to control pollution.
4. The Department has shared the services of its Assistant Attorney General to support the pollution control activities of the Health Department and Water Resources Commission. Since November, 1961, Federal funds have made possible part-time employment of a Special Assistant Attorney General by the Commission.

5. Institute of Fisheries Research at Ann Arbor, a part of the Department of Conservation, has over many years made its laboratory facilities and scientific knowledge available to provide Commission staff with fish tolerances and other information necessary to fish propagation and development.

6. The Department is the single largest contributor to the State's share of the U.S. Geological Survey program of stream flow and lake levels investigation.

7. The Department looks to the Commission and Health Department to improve the quality of water at Sterling State Park and Pointe Mouillee just as early as possible.

8. Governor Swainson has recently assigned the Department the task of conducting a broad State recreational study and to prepare a recreation plan. Water quality information coupled with unrelenting effort to improve such conditions where necessary by the Commission and Health Department is of utmost importance to this program.

9. Docking and headquarters accommodations provided Water Resources Commission staff and boat at Pointe Mouillee.

## Director of Agriculture (Member)

## and

## Department of Agriculture (Water Pollution)

While possessing no officially direct responsibility for the control of water pollution, the Director of Agriculture finds himself in a position to view the problem from several vantage points.

He has on occasion had to carry the pollution complaints of aggrieved farmers before the Commission. He is also ex-officio Chairman of all Intercounty Drainage Boards. These are frequently involved in drain pollution matters. Section 423, Act 40, P.A. 1956, defines the unlawful use of county drains and intercounty drainage facilities. For some years past it has been "unlawful to connect sewage or other waste to county or intercounty drains except with the written approval" of the appropriate authority. Yet offensive conditions continue to appear in too many locations. In the absence of a petition to take action to correct misuse of county drains, the individual commissioner or intercounty board claims inability to act. The Water Resources Commission may file the necessary petition with the Drain Commissioner on a showing of injury to public health certified by the State Health Commissioner. With one possible exception, however, such petitions have failed in the past to bring results. It follows, therefore, that attempts under Drainage Code to provide outlets for sewage or waste and land drainage in the same facilities without creating odor nuisance or unlawful pollution, have not been successful.

The Director of Agriculture has official connections with several farm product promotion groups. The rocessing of these products for market, gives rise to sewage or waste whether milk, apples, peaches, cherries, livestock, animal hides, or pulpwood are involved. Such wastes comprise a substantial percentage of the total number of industrial waste problems with which the Commission and staff must necessarily deal.

## State Highway Commissioner (Member)

## and

## Highway Department (Water Pollution)

While his Department interests are for the most part in other phases of the State's water resources program, the Commission looks to the State Highway Commissioner through his authorized deputy to prevent misuse of many thousands of miles of Department-owned drains.

State Highway drains, open and closed, invite "midnight" and other connections to receive septic tank drainage, sewage and industrial wastes--always with the same end result.

The State Highway Commissioner makes a substantial annual contribution to the State's portion of the U. S. Geological Survey program of stream gaging.

Appointive Members

The appointive citizen members of the Commission have three year staggered terms of office. Two of them represent the most commonly encountered sources of waste or pollution which comes from certain industries and all municipalities. Conservation groups and interests, on the other hand, are ever seeking an improved natural water quality in the best interest of fish and wildlife, recreation and other uses of waters of the State.

I want to put this on the record at the request of the Chief Engineer. Mr. Clarke, speaking yesterday about the work of the United States Geological Survey --

THE CHAIRMAN: It should be emphasized you are talking about Mr. Clarke of the Geological Survey and not Mr. Clark of the Public Health Service.

MR. ADAMS: When the Clarke of the United States Geological Survey appeared, he mentioned 7,000 basic data stations. I think we account for about 200 of them, and this gives our distribution. I would like to submit this table.

Thank you very much.

(The table referred to is as follows:)

U.S.G.S. Program 1961-62

| | | |
|---|---|---|
| ter Resources Commission | | |
| Cash (surface water) | $14,300 | |
| Services (quality of water) | 3,600 | |
| ghway Department | | |
| Cash (surface water) | 8,400 | |
| Conservation Department | | |
| Cash | | |
| Surface water | 31,630.63 | |
| Ground water | 19,038.65 | |
| Quality of water | 500.00 | |
| Services | | |
| Surface water | 10,500 | |
| Ground water | 7,000 | |
| Total State | | $94,969 |
| Local contributions | | |
| Cash | | |
| Surface water | 43,325 | |
| Ground water | 15,100 | |
| Quality | 3,350 | |
| Services | | |
| Ground water | 1,400 | |
| Total local | | 63,175 |
| Total non-Federal | | 158,144 |
| Federal | | |
| U.S.G.S. | | |
| Surface water, matching | 108,155.63 | |
| Surface water, unrestricted | 20,100 | |
| Ground water, matching | 42,538.65 | |
| Ground water, unrestricted | 735 | |
| Quality of water, matching | | |
| U. S. Corps of Engineers | | |
| Surface water | 14,275 | |
| U.S. Fish and Wildlife | | |
| Surface water | 1,540 | |
| Ground water | 3,600 | |
| Federal Power Commission | 900 | |
| Total Federal | | $199,293 |

DR. HEUSTIS: Mr. Oeming, will you continue?

MR. OEMING: At this time, with a very brief introduction, Mr. John Vogt, the Director of the Division of Engineering, Michigan Department of Health, and Donald M. Pierce, the Chief of the Section of Sewerage and Sewage Treatment of the Division of Engineering, will present a joint review and brief of Chapter II on Municipal Sewage Collection and Treatment.

STATEMENT OF JOHN E. VOGT, DIRECTOR OF THE DIVISION OF ENGINEERING, MICHIGAN DEPARTMENT OF HEALTH, AND DONALD M. PIERCE, CHIEF OF THE SECTION OF SEWERAGE AND SEWAGE TREATMENT OF THE DIVISION OF ENGINEERING

MR. VOGT: Mr. Chairman, Conferees, and Ladies and Gentlemen: For the benefit of the reporter, I am Mr. Vogt. My colleague is Mr. Pierce.

## CHAPTER II. MUNICIPAL SEWAGE COLLECTION AND TREATMENT

The river basins of the Southeastern Michigan region extend into Macomb, Oakland, Wayne, Washtenaw, Lenawee and Monroe Counties. The region contains a total of 104 incorporated villages and cities.

Twenty-six municipalities with a total population of 34,686 have no sewer systems but rely on individual household disposal methods. The largest municipality in this group is Novi on the upper reaches of the Huron River with opulation of 6,390.

The remaining 78 municipalities, together with 0 townships which are served either wholly or in part by wers, total 98 governmental units having sewer systems. All of these governmental units provide treatment in degrees varying from primary settling type plants to secondary treatment by biological oxidation using trickling filters or the activated sludge process. Chlorination of the effluents is practiced at all plants except one, at least during the period May 15 to September 15 of each year. The waste assimilating capacity of the receiving waters and the prevention of unlawful pollution defined by state statute have dictated the selection of degree of treatment throughout the region. Accordingly, plants providing secondary treatment predominate on the tributary streams while primary treatment plants are situated along or immediately adjacent to the shoreline of the Detroit River.

Treatment of the sewage from the 98 governmental units is provided in 44 plants. In some instances one plant treats the sewage from a single governmental unit or a section thereof. In others, a plant serves as an area facility receiving the sewage from a number of governmental units under contractual arrangements made either directly with the city owning the plant or through a county or a contracting agency created under State law.

The following sections of this chapter give detailed information on the type and extent of the sewer systems, the disposal and treatment methods in effect at all governmental units within the region. It presents the opinions of the staff of the two State agencies on the adequacy of the systems and methods of disposal or treatment in preventing unlawful pollution as defined in the State statutes.

## Detroit River

Waste discharges into the Detroit River from municipalities consist of shoreline installations and those discharging indirectly through the Rouge River and Ecorse Creek. These sources may be categorized as the treated effluents from sewage treatment plants, untreated sewage and intermittent overflows from combined sewer systems. Along the shoreline are three major sewage treatment plants: one owned by the City of Detroit near the mouth of the Rouge River; the plant at Wyandotte owned by Wayne County; and the Wayne County plant at Trenton. On Grosse Ile a small treatment plant serving a subdivision discharges to the river. Other sewered areas on the island are connected to septic tank facilities which also discharge to the river.

The combined sewer systems of all of the shoreline communities from St. Clair Shores to Trenton discharge mixtures of sewage and storm water during periods of surface noff. One shoreline community, Grosse Pointe, has a parate sanitary sewer system. With the notable exception Grosse Pointe Woods, interceptor facilities are designed operated so as to retain for treatment up to about 325 gallons per capita from combined sewers.

Wastes originating in the Rouge River consist primarily of the effluent from the Dearborn Sewage Treatment Plant and the raw sewage bypassed at this plant. Overflows from combined sewer systems of Detroit, Dearborn and other upstream communities during periods of runoff also contribute to the pollutional load on the Detroit River.

To the above may be added direct discharges from homes, either untreated or as effluent from septic tanks.

## Detroit

The city has a population of 1,670,144. Virtually all occupied properties are connected to the combined sewer system.

Pollution control was established in 1940 when a primary type sewage treatment plant with effluent disinfection was completed. Two major sanitary interceptors were completed at that time. One, known as the Detroit River Interceptor, runs parallel with the Detroit River, extending from the sewage treatment plant to the northeastern boundary of the city at Grosse Pointe Park. The other, known as the Northwest Interceptor, runs parallel with the Rouge

River. The first section, constructed at that time, extended a short distance northwesterly from the sewage treatment plant and was known as the Oakwood Section. These two interceptors, having a combined capacity of about 2,000 cubic feet per second, were designed to transport sewage to the treatment plant from an ultimate population of 4 million. Subsequently, the Northwest Interceptor was constructed in stages as a major branch of the Oakwood Interceptor extending northwesterly to serve the northwestern areas.

The sewage treatment plant was so designed as to be readily expanded in stages to provide treatment for an ultimate population of 4 million and flow rates of 2,000 cubic feet per second. Additions have been built to meet the needs of an expanding service area, the most recent of which were completed last year. Other improvements are currently scheduled for construction.

The interceptor system and sewage treatment plant were so designed and constructed that the city may provide service to a large district outside of the city by accepting sewage at or near its corporate limits and delivering it to its treatment works. This district today includes 47 communities with a connected population including Detroit of over 2.5 million. These communities, whose sewerage facilities are described in this report, are grouped by service areas in Table 1.

## Table I

## Communities in Detroit Service Area For Sewage Treatment - Presently Connected

### Detroit River Interceptor District

A. Directly Connected to Detroit

- Center Line
- Grosse Pointe
- Grosse Pointe Farms
- Grosse Pointe Park
- Hamtramck
- Highland Park

B. Connected by Wayne Count Metropolitan Sewerage and Sewage Disposal System (Northeast Interceptor District)

- Grosse Pointe Shores
- Grosse Pointe Woods
- Harper Woods
- East Detroit
- Roseville
- St. Clair Shores

C. Connected by Oakland County (Southeast Oakland County Sewage Disposal System)

- Berkley
- Beverly Hills (portion)
- Birmingham (portion)
- Clawson
- Ferndale
- Hazel Park
- Huntington Woods
- Madison Heights
- Oak Park
- Pleasant Ridge
- Royal Oak
- Royal Oak Township
- Troy (Portion)

## II. Northwest Interceptor District

### A. Directly Connected to Detroit

Allen Park
  (north portion)
Dearborn
  (east portion)
Farmington
Melvindale

### B. Connected by Wayne County Metropolitan Sewerage and Sewage Disposal System (Middle Rouge District)

Dearborn Township
  (portion)
Garden City
Livonia
Nankin Township
Northville
Northville Township
Plymouth
Plymouth Township
Redford Township

### C. Connected by Oakland County (Evergreen-Farmington Interceptor Districts)

Beverly Hills
  (portion)
Birmingham
  (portion)
Bloomfield Hills
Bloomfield Township
Farmington Township
Keego Harbor
Lathrup Village
Pontiac Township
Southfield
  (portion)
Troy
  (portion)
West Bloomfield Township

In addition to the communities listed above, the City of Detroit contracted in the fall of 1961 to provide sewage treatment services to the following communities through its Northwest Interceptor sewer system by connection to be completed by July, 1962.

Dearborn
(west side)
Inkster

Nankin Township
(portion)
Wayne

Adequacy of the existing facilities to control pollution and provide the requisite protection prescribed by existing Michigan statutes is under continuing consideration and evaluation by the Michigan Department of Health and Water Resources Commission.

The sewage treatment facilities currently in operation are capable of providing that degree of treatment normally associated with primary sedimentation with mechanical sludge removal and effluent disinfection for the presently connected population. An intensive laboratory study conducted by the plant operating staff on bacteriological control of the plant effluent, involving some adjustment in chlorination methods and testing procedures, will provide significantly improved bacteriological controls to be exercised this year.

In recent years and yet today large quantities of raw and poorly treated sewage are discharged by the City of

Dearborn and the Wayne County Metropolitan Sewerage and Sewage Disposal System in addition to many large and varied industrial discharges into the Rouge and Detroit Rivers in waters also affected by the waste discharges of the City of Detroit. The effects of these multiple discharges on water quality for long distances downriver are to a very significant extent additive, cumulative, and interrelated.

No reasonably accurate determination of the separate effect of discharges from the two major systems of Detroit and Wayne County can be made until the control measures currently planned and under way at Detroit, Dearborn and the Wayne County system have been effectuated.

MR. PIERCE: Areas Served by Detroit

Areas served by the Detroit sewerage system lie in Wayne, Oakland and Macomb Counties within the drainage basins of the Rouge River, Clinton River, Detroit River, Ecorse Creek and Lake St. Clair. As previously indicated in Table I and detailed in Table II, 10 communities or portions thereof are connected directly to the Detroit system. All other communities are located in areas served by Wayne and Oakland County agencies which deliver sewage to the Detroit system by contractual arrangement with each community and Detroit.

## Communities Directly Connected

The sewer systems and sewered population of communities connected directly to Detroit are summarized in Table II.

The present connected population in these areas is estimated at about 200,000.

Table II

| Community | Pop. (1960) | % of Pop. Sewered | Type of Sewers | Combined Sewer Overflows Discharge To |
|---|---|---|---|---|
| Allen Park (north portion) | 5,000 | 50 | San. | -------- |
| *Center Line | 10,164 | 100 | Comb. | Clinton River (Bear Creek) |
| Dearborn (east portion) | 56,000 | 100 | Comb. | Rouge River |
| Farmington | 6,881 | 90 | Comb. | Rouge River |
| Grosse Pointe | 6,631 | 100 | San. | -------- |
| Grosse Pointe Farms | 12,172 | 100 | Comb. | Lake St. Clair |
| Grosse Pointe Park | 10,457 | 100 | Comb. | Lake St. Clair |
| Hamtramck | 34,137 | 100 | Comb. | Completely intercepted to Detroit |
| Highland Park | 38,063 | 100 | Comb. | Completely intercepted to Detroit |
| Melvindale | 13,089 | 100 | San. | -------- |

*Currently being connected to Detroit - See also Clinton River Basin

County Sewerage Districts

The sewered population and types of sewer systems in districts in Wayne, Oakland and Macomb Counties connected to the Detroit sewerage system are summarized in Table III.

Table III

| County Sewerage Districts | River Basin | Est. Sewered Pop. | Type of Sewers |
|---|---|---|---|
| Wayne County | | | |
| Rouge Valley (Middle Rouge Section) | Rouge River | 275,000 | Largely san. |
| Northeast Interceptor (Includes South Macomb Sanitary District) | Lake St. Clair | 225,000 | Half san. - half comb. |
| Oakland County | | | |
| Evergreen-Farmington Districts | Rouge River | 100,000 | Largely san. |
| Southeast Oakland Co. Sewage Disposal District | Clinton River | 275,000 | Largely comb. |

Wayne County - Rouge Valley District (Middle Rouge Section)

The pollution control facilities provided by the county in this district consisted originally in 1940 of several sections each physically separated from the other. One portion was known as the Middle Rouge System and the other as the Michigan Avenue Interceptor (now called the Lower Rouge Branch - see Rouge River). About 1940, two interceptor sewers were completed and placed in operation. Each terminated at a new treatment plant discharging into the Middle Branch of the Rouge River. In 1954 the plants were abandoned and the interceptor sewers were joined and extended to the Detroit Northwest Interceptor so as to deliver all of the sewage from the sewered areas of the following communities to Detroit.

The communities served by these facilities are identified in Table IV. Present connected population is estimated at about 275,000.

Table IV

| Community | Pop. (1960) | % of Pop. Sewered | Type of Sewers | Combined Sewer Cver-Flows Discharge to |
|---|---|---|---|---|
| Dearborn Township (North portion) | 40,000 | 90 | Largely San. | ------- |
| Garden City | 32,017 | 100 | Largely comb. | Rouge River |
| Livonia | 66,702 | 90 | Largely san. | ------- |
| Nankin Township | 67,183 | 80 | Largely san. | ------- |
| Northville | 3,967 | 90 | San. | ------- |
| Plymouth | 8,766 | 100 | San. | ------- |
| Plymouth Township | 8,364 | 50 | San. | ------- |
| Redford Township | 71,276 | 100 | Comb. | Rouge River |

MR. VOGT: The sewer systems existing in this area prior to 1940 were largely of the combined type. During the last 10 years all communities in this area have developed sanitary sewer systems in newly sewered areas and have converted systems from combined to separate type in certain built-up areas.

Existing interceptor facilities do not have sufficient capacity and are inadequate to control local health hazards and provide the requisite protection prescribed by Michigan statutes. Inadequacies of the system were officially recognized by the county in 1956. In December, 1958 the Michigan Department of Health, following a series of meetings with officials and committees of the county having official responsibility for the system, notified the county and the communities in this service district of the deficiencies of the system. An agreement was reached by the department and the county's agent, the Road Commission, to enlarge and improve the system with completion of all work by March 1, 1962. Although the need for the scheduled improvements was generally recognized and undisputed, the communities could not agree on the method of financing or the division of costs. Accordingly, in June, 1959 the State Health Commissioner notified all communities in the district that henceforth, until construction of the needed facilities was assured, no sewer extensions would be approved. Continued failure to proceed with the required construction prompted the State Health Commissioner in June, 1961 to order all communities in the district to desist from adding any more connections to existing sewers.

In December, 1961 construction contracts were let for improvements to this system sufficient to provide capacity adequate for the 1980 projected population. This work involves a relief interceptor and a new section of an interceptor to deliver flow from this area to Detroit together with the total flow from the Lower Rouge Branch.

The work on this project has been scheduled so as to provide temporary relief for present flows by July, 1962 with completion of the total project by December, 1963. When this construction was assured in August, 1961 the Health Department removed its restrictions on sewer construction and use in this area.

Wayne County - Northeast Interceptor District

Pollution control facilities consist of an interceptor sewer and pumping station to collect sewage and transport it to Detroit for treatment from the South Macomb Sanitary District and three Wayne County communities. The summary in Table V identifies the communities and their sewer systems. Present connected population is estimated at about 225,000.

Table V

| Community | Pop. (1960) | % of Pop. Sewered | Type of Sewers | Combined Sewer Overflows Discharge to |
|---|---|---|---|---|
| *South Macomb San. Dist. | 165,000 | 100 | San. - 40%<br>Comb. - 60% | Lake St.Clair |
| Grosse Pointe Shores | 2,301 | 100 | Comb. | Lake St.Clair |
| Grosse Pointe Woods | 18,580 | 100 | Comb. | Lake St.Clair |
| Harper Woods | 19,995 | 100 | San. | ------- |

*See South Macomb Sanitary District, pages 22 to 23.

Overloading of interceptor and pumping facilities by 1956 prompted the State Health Commissioner to impose restrictions on sewer extensions in this service area in a manner similar to that taken in other Wayne County areas (see Rouge Valley District above). When relief facilities providing adequate capacity were placed under construction in the spring of 1961 these restrictions were removed. These facilities, when completed this year, will have adequate capacity for ultimate development of this service area. Other work in this area to control pollution is noteworthy. The facilities for retention and treatment of combined sewer overflows for Grosse Pointe Woods and Harper Woods (see Lake St. Clair - Milk River Drainage System) completed last year provide a large measure of control for these wastes. A similar project is proposed by communities in the South Macomb Sanitary District.

South Macomb Sanitary District

In 1943 the County of Macomb completed construction of an interceptor sewer and related control facilities for interception of sewage from the 9 Mile Drain and Martin Drain which were utilized as major combined sewer outlets for the following communities: East Detroit, Roseville, St. Clair Shores, Warren and Center Line. Overflows from the combined sewers and drains discharged to Lake St. Clair (see Lake St. Clair - South Macomb Sanitary District). The sewage intercepted from these drains was delivered to the Wayne County Sanitary Interceptor which transported the sewage to Detroit for treatment (see Wayne County Metropolitan Sewerage and Sewage Disposal System - Northeast Interceptor District; also Detroit - Table I, Section 1A).

In 1948, the South Macomb Sanitary District was created to acquire and operate this interceptor system by contractual agreement among the communities served by it. The service district today consists principally of East Detroit, St. Clair Shores and Roseville as shown in Table VI. Total population connected to the system is estimated at about 165,000.

(The City of Warren has provided its own treatment facilities and Center Line is being connected directly to Detroit.)

Table VI

| Community | Pop. (1960) | % of Pop. Sewered | Type of Sewers | Combined Sewer Overflows Discharged to |
|---|---|---|---|---|
| East Detroit | 45,956 | 100 | Comb. | Lake St. Clair |
| *Roseville | 40,195 | 100 | Comb. | Lake St. Clair |
| St. Clair Shores | 76,657 | 10<br>70 | Comb.<br>Sep. | Lake St. Clair<br>------- |

*Approximately 10,000 additional population connected to Clinton Township sewerage system.

Existing pollution control facilities are not adequate to control local health hazards and provide the requisite protection prescribed by Michigan statutes. These inadequacies were established by the Water Resources Commission in 1958 when statutory proceedings were instituted against the communities comprising the district. In 1960 the communities formally stipulated to provide improvements to the system by September 1963. This work is to consist of increased control of combined sewer overflows and higher rates of interception to the Wayne County Northeast Interceptor for treatment. The latter is to be completed this year.

MR. PIERCE:

Oakland County - Evergreen and Farmington Interceptor Districts

The Evergreen-Farmington Interceptor Districts were established in 1957 under the provisions of the County Department of Public Works statute. Construction of a system of interceptor sewers, major trunk sewers and related facilities to collect sewage from the communities listed in Table VII was commenced in 1959. The sewage from this area has been delivered to Detroit for treatment since July, 1960 (see Detroit - Table I, Section 11C). Total population presently connected to the interceptors is estimated at about 100,000.

(Table VII is as follows:)

Table VII

| Community | Pop. (1960) | %of Pop. Sewered | Type of Sewers | Combined Sewer Overflows Discharge To |
|---|---|---|---|---|
| Beverly Hills (portion) | 5,000 | 100 | Comb. | Rouge River |
| Birmingham (portion) | 20,000 | 100 | Largely San. | ------- |
| Bloomfield Hills | 2,378 | 50 | Largely San. | ------- |
| Bloomfield Township | 22,530 | 50<br>20 | San.<br>Comb. | -------<br>Rouge River |
| Farmington Township | 26,692 | 30 | San. | ------- |
| Keego Harbor | 2,761 | 90 | San. | ------- |
| Lathrup Village | 3,556 | 100 | Comb. | Rouge River |
| Pontiac Township (portion) | 9,091 | 5 | San. | ------- |
| Southfield | 31,501 | 70 | Largely San. | ------- |
| Troy (portion) | 3,000 | 75 | San. | ------- |
| West Bloomfield Twp. | 14,994 | 40 | San. | ------- |

These facilities with provision for treatment by Detroit were constructed in compliance with Orders of the Water Resources Commission of 1952, affirmed by decree of the Circuit Court, to abate pollution of the Rouge River.

Until connection was made to the Evergreen Interceptor, the sewage from Birmingham, Bloomfield Hills, Bloomfield Township and that portion of Troy in the Rouge Basin had been treated at the overloaded sewage treatment plant at Birmingham. Sewage from several other areas was discharged directly to the Rouge River.

Rates of interception from the combined sewered areas of Birmingham, Beverly Hills and Bloomfield Township are regulated at about 10 times the normal dry weather flow rate. Studies are in progress to determine the adequacy of these controls. Adjustments in these controls are to be made as required for adequate protection.

The combined sewer system of Lathrup Village is to be converted to a separate system with connection of the sanitary sewer system to the Evergreen Interceptor. This action is in conformity with the Circuit Court Decree of 1961 enforcing an Order of the Water Resources Commission.

When these adjustments in local facilities are completed, adequate pollution control will be established in these districts.

## Southeast Oakland County Sewage Disposal System

The County of Oakland since 1943 has built and maintained a sewerage system consisting of an interceptor sewer and pumping facilities which deliver sewage to Detroit from the 13 communities located in Southeastern Oakland County for treatment and disposal. The communities served by the system are listed in Table VIII. Total population presently connected is estimated at about 275,000.

Table VIII

| Community | Pop. (1960) | % of Pop. Sewered |
|---|---|---|
| Berkley | 23,275 | 100 |
| Beverly Hills (portion) | 3,633 | 100 |
| Birmingham (east portion) | 5,525 | 100 |
| Clawson | 14,795 | 70 |
| Ferndale | 31,347 | 100 |
| Hazel Park | 25,631 | 100 |
| Huntington Woods | 8,746 | 100 |
| Madison Heights | 21,343 | 100 |
| Oak Park | 36,632 | 100 |
| Pleasant Ridge | 3,807 | 100 |
| Royal Oak | 80,612 | 100 |
| Royal Oak Township | 8,147 | 100 |
| Troy (portion) | 8,000 | 40 |

The combined sewer systems of these communities discharge into three major county drains, built originally as surface water drains. Prior to 1943 the entire contents of these drains including all of the wastes from this area were discharged into Red Run, a branch of the Clinton River, improved as an intercounty drain.

When the interceptor sewer and pumping station were built in 1943, all dry weather flow and some storm water was intercepted for treatment, but in recent years even the dry weather flow has exceeded the capacity of the interceptor, resulting in some overflow to Red Run.

Inadequacies of the existing system of drains and sanitary interceptor facilities are two-fold. Lack of capacity in the local combined sewers and county drains causes flooding of basements and streets with mixtures of sewage and storm water; and lack of capacity in the county interceptor sewer results in excessive overflows to Red Run. Both of these deficiencies create a menace to public health and constitute violations of Michigan statutes. These deficiencies have been officially recognized by the communities, the county and the state regulatory agencies since about 1951.

In 1952 the Water Resources Commission held a conference with the county and the communities served by the system to consider deficiencies in facilities. In 1953 the Michigan Department of Health alerted responsible local officials to the need for building relief facilities. Accordingly, the County Drain Commissioner as agent for the county authorized the preparation of plans for construction of both relief sewers and pollution control facilities. Although the need for the planned facilities was generally recognized and undisputed, the communities could not agree on the division of costs. When in 1957 very little progress had been made, the Michigan Department of Health formally ordered the communities in the area and the county to construct these facilities. Continuing disagreement over cost apportionment greatly delayed the project, as litigation in both Circuit and Supreme Courts extended over a five year period, terminating in the fall of 1961 with resumption of proceedings to finance and build the facilities.

Relief sewer facilities are currently under construction. A new interceptor coupled with facilities for control of overflows from combined sewers, both adequate for ultimate development of the area, are expected to be under construction this year.

All of the sewage from this area together with the retained storm water will be delivered to Detroit for treatment. The excess, not so intercepted, will be discharged to Red Run.

MR. VOGT:

Wayne County Metropolitan Sewerage and Sewage Disposal System

The County of Wayne since 1939 has built and maintained a system of interceptor sewers, major trunk sewers and sewage treatment works serving the majority of the sewered area of the county with the notable but not exclusive exception of Dearborn, Melvindale, Detroit and those communities entirely or substantially surrounded by Detroit. (The Northeast Interceptor District and Rouge Valley District, which are connected to Detroit for treatment, have been discussed above as a part of the Detroit service area.)

The original system completed in 1939-40 included an interceptor sewer terminating at the sewage treatment plant located at Wyandotte to serve several communities in the area generally south of Detroit. Another interceptor and treatment plant were built to serve the City of Trenton.

Wyandotte District (also known as Downriver District)

Pollution control facilities consist of a sewage treatment plant of the primary type with effluent disinfection and an interceptor sewer in combination with a county drain for collecting sewage from local community systems and delivering same to this plant.

The following summary identifies the communities or portions of communities served by these facilities. Connected population is estimated at 275,000.

(Table IX is as follows:)

Table IX

| Community | Pop. (1960) | % of Pop. Sewered | Type of Sewers | Combined Sewer Overflows Discharge To |
|---|---|---|---|---|
| Allen Park (south portion) | 37,052 | 90 | Comb. | Ecorse Creek |
| Dearborn Township (south portion) | 39,809 | 100 | San. | ------- |
| Ecorse | 17,328 | 100 | Comb. | Ecorse Creek - Detroit River |
| Lincoln Park | 53,933 | 100 | Comb. | Ecorse Creek |
| River Rouge | 18,147 | 100 | Comb. | Rouge River |
| Riverview | 7,237 | 85 | Comb. - 70%<br>Sep. - 30% | Huntington Drain<br>------- |
| Southgate | 29,404 | 80 | Comb. | Detroit River |
| Taylor Township | 49,658 | 70 | Sep. | ------- |
| Trenton (north portion) | 1,000 | 100 | Comb. | Detroit River |
| Wyandotte | 43,549 | 100 | Comb. | Detroit River |

The local sewer systems of the communities are largely of the combined sewer type with overflows discharging into Ecorse Creek, Rouge River and the Detroit River during runoff periods. Two major county drain systems, the LeBlanc Drain and No. 5 Drain, are utilized as combined sewers to provide local service to portions of these areas.

In 1956 it was recognized by the State Health Department and confirmed by engineers of the County Road Commission, who operated the county-owned system as the county's agent, that reserves in capacity in the interceptor system were rapidly diminishing. The department notified the county and the communities served by the district of the impending deficiencies, entered into an agreement with the county, imposed restrictions on sewer construction in June, 1959, ordered further reduction in use of sewers in June, 1961 and in all respects took actions and adopted measures similar to those taken in the Rouge Valley District as outlined previously.

These restrictions and those denying approval of sewer extensions are still in effect today. These measures have been responsible to a marked degree for the determined effort by all parties in recent months to accelerate the entire project for construction of relief interceptors, treatment works and trunk sewers. Contracts have been signed and an accelerated time schedule calls for commence-ment of construction by June, 1962.

Work scheduled for completion by October, 1962 consists of additional settling tanks and chlorination facilities sufficient to provide the degree of treatment to be expected from adequate primary type sewage treatment facilities with effluent disinfection. The installation of two-stage chlorination will assure a high degree of bacteriological control.

The remainder of the project, scheduled for completion by July, 1963, will substantially reduce overflows from combined sewer areas, reduce local overloads on trunk and interceptor sewer systems, enlarge and extend treatment facilities for future needs and extend trunk sewers into areas now undeveloped or lacking in sewer systems. As indicated in other portions of this report, equivalent controls are scheduled for completion in other nearby areas concurrently with this project.

When the proposed facilities are completed there will be overflows from combined sewer systems for a portion of the original service area. Adequacy of the completed facilities, in combination with other improvements made concurrently in other nearby communities and industries whose waste discharges affect the same reaches of the Detroit River, will be evaluated and determined at that time by the Water Resources Commission and the Michigan

Department of Health. No reasonably accurate determination of the separate effect of discharges from this system can be made until all the control measures currently scheduled for completion by the end of 1963 are in operation.

Trenton District

Since 1940 the county has built and operated a sewage treatment plant at Trenton and an interceptor sewer to serve the majority of this city. In 1957 the Village of Gibraltar was connected to this plant on the condition that the plant be expanded and improved. Although this condition was accepted by the county, no progress toward construction had been made by June, 1959. The restrictions imposed by the Michigan Department of Health on sewer construction in June, 1959 and June, 1961 were identical to those outlined in the preceding discussion on the Wyandotte (Downriver) District. Steps taken by the City of Trenton to construct its own sewage treatment plant have retarded the program for correction of existing deficiencies.

Existing facilities are grossly overloaded and not adequate to provide treatment sufficient to control pollution as prescribed by Michigan statutes.

It is expected that corrective measures to provide an adequate facility will be undertaken by early summer by the city or the county and completed by early 1963.

The sewered populations and sewer systems of the two communities served by these facilities are summarized in Table X. Present connected population is estimated at about 20,000.

Table X

| Community | Pop. (1960) | % of Pop. Sewered | Type of Sewers | Combined Sewer Overflows Discharge to |
|---|---|---|---|---|
| Gibraltar | 2,196 | 20 | San. | ------- |
| *Trenton | 17,439 | 60 | San. | ------- |
| | | 40 | Comb. | Detroit River |

*See also Wyandotte District (Table IX).

## Grosse Ile Township

The township has a population of 6,318. Approximately 50 percent of the occupied dwellings are served by a public sewer system and the remainder have private systems consisting of septic tank and tile field. About 50 percent of the dwellings in the sewered area are connected to combined sewers, the remainder being connected to sanitary sewers.

The combined sewers are county drains which discharge into the Detroit River at several locations. Treatment facilities are inadequate on the combined sewer systems. In 1957 the Water Resources Commission, acting on a finding of the State Health Commissioner that the inadequate sewerage facilities constituted a menace to public health, petitioned the Wayne County Drain Commissioner to take the necessary steps to correct the deficiencies. The Drain Commissioner expects to begin construction of a new treatment plant and interceptors to serve the needs of the township this summer and to complete same in 1963.

Combined sewer overflows discharge into the Thoroughfare Canal and Detroit River and are under surveillance by the Michigan Department of Health to determine the need for additional control beyond that presently provided.

The sanitary sewers were built in 1956-57 and connect to an adequate primary type treatment plant with effluent disinfection before discharging to the Detroit River.

MR. PIERCE:

## Rouge River

Waste discharges to the Rouge River consist of the effluent from the Dearborn Sewage Treatment Plant and overflows from combined sewer systems of Detroit, Dearborn and several other communities in Wayne and Oakland Counties. As the lands adjacent to the river have been developed increasingly for organized recreation and residential purposes, it has become increasingly necessary to reduce waste discharges to a minimum. As discussed earlier under the Wayne County - Rouge Valley and Oakland County - Evergreen-Farmington District of the Detroit sewerage system, sewage from these major districts previously discharged to the Rouge River is now connected to the Detroit system for discharge to the Detroit River. The City of Farmington, which previously discharged to the Rouge River, has also been connected to the Detroit System.

All that remains in the Rouge River today is the Dearborn Sewage Treatment Plant effluent and the overflows from combined sewer system. Such overflows occur under varying conditions of runoff in certain areas in Detroit, Dearborn and other communities in Wayne and Oakland Counties.

The sewage treatment plant owned and operated by Dearborn serves the west portion of Dearborn and three communities in the Lower Rouge section of the Rouge Valley District of the Wayne County Metropolitan sewerage and sewage disposal system. Areas connected to the plant are shown on Table XI. Connected population is estimated at about 150,000.

(Table XI is as follows:)

Table XI

| Community | Pop. (1960) | % of Pop. Sewered | Type of Sewers | Combined Sewer Overflows Discharge To |
|---|---|---|---|---|
| *Dearborn (west side) | 56,000 | 100 | Comb. | Rouge River |
| Wayne County System: | | | | |
| Inkster | 39,097 | 100 | San. - 80%<br>Comb. - 20% | -------<br>Rouge River |
| Nankin Township (south portion) | 30,000 | 85 | San. | ------- |
| Wayne | 19,071 | 100 | San. - 80%<br>Comb. - 20% | -------<br>Rouge River |

*See also Detroit connection for east portion.

**Dearborn**

The city has a population of 112,007. Virtually all occupied properties are connected to the combined sewer system.

Pollution control was first established in 1931 when the west side chemical precipitation treatment plant and the east side primary type treatment plant were completed. In 1939 additions to the west side plant were completed. Treatment service was provided also for the area in the City of Detroit served by the Southfield sewer. This portion of the City of Detroit was later connected to the Detroit treatment plant. In 1940 treatment service was extended to Wayne, Inkster and part of Nankin Township (see next section).

In conformity with a stipulation to the Water Resources Commission, the City of Dearborn discontinued use of the east side treatment plant by making a connection to the Detroit Northwest Interceptor and treatment plant in 1959. Construction has started on a connection for the west portion of Dearborn to this same interceptor and is expected to be completed by July, 1962. When this connection is completed all of the sewage from Dearborn, Wayne, Inkster and a portion of Nankin Township will be treated by Detroit.

Combined sewer overflows to the Rouge River are under surveillance by the Michigan Department of Health to determine the need for additional control beyond that presently provided.

## Farmington - Treatment of Combined Sewer Overflows

The City of Farmington has a system of sewers, largely of the combined type, serving virtually all the present population of 7,000. In 1957 the city established pollution control in conformity with an Order of the Water Resources Commission adopted April, 1952 and affirmed by Circuit Court Decree of 1953.

Facilities consist of a connection to the Detroit sewer system for rates of flow about three times the average. This connection was made in 1956. In addition, the city in 1957 placed in operation sedimentation and chlorination facilities for control of the excess flows from the combined sewer system during wet weather. Adequate control of pollution is provided by this combination of facilities.

## Wayne County - Rouge Valley District - Lower Rouge Section

About 1940 an interceptor sewer was constructed by the county generally parallel with the lower branch of the Rouge River to collect sewage from the communities listed in Table XI and convey it to Dearborn for treatment at the Greenfield Road (west side) plant.

The sewer systems of these communities were largely of the combined type. Some progress has been made in recent years to convert these sewers to separate systems.

As in the Middle Rouge Section and in the Downriver District, it was recognized in 1956 that serious deficiencies existed in the facilities to control pollution for this area. The greatest deficiency was lack of capacity at the Dearborn, plant to provide treatment for wastes delivered from this district together with wastes collected within the City of Dearborn. No reserve capacity remained at that time in the interceptor. Actions taken by the department to acquaint responsible officials with the need for immediate correction and to restrict further overloading of the sewer system were identical to those taken in relation to the Middle Rouge area previously discussed.

In August, 1961 contracts were executed between the Cities of Detroit and Dearborn to connect to the Detroit Northwest Interceptor. This work is scheduled for completion by July, 1962. In addition, contracts between the county, the communities in this service area and Dearborn call for utilization of this same connection to Detroit for a temporary period pending completion of a new and separate interceptor connection to Detroit to be built by the county to serve this area. This interceptor is also under contract for construction. The connection to Detroit, both in its temporary and permanent form, will remove the discharge of untreated sewage and inadequately treated plant effluent from the Rouge River.

Pollution control facilities thus provided will have sufficient capacity adequate for the 1980 projected population.

THE CHAIRMAN: We will recess at this time for ten minutes.

(Whereupon a recess was had.)

THE CHAIRMAN: May we reconvene. It is always rash to make predictions, but we confidently hope with the cooperation of the people here we will be able to be through this afternoon. Our schedule now will call for a prompt recess for lunch at twelve o'clock, one hour and a quarter for lunch, and we will convene at one-fifteen p.m. and push on until we are completed. Dr. Heustis.

DR. HEUSTIS: Mr. Pierce, will you continue, if you please.

MR. PIERCE: Yes.

## Clinton River

There are 20 communities located along the Clinton River and its branches from mouth to headwaters. The municipal facilities for collection and treatment of sewage in these communities is summarized in Table XII.

Table XII

| | |
|---|---|
| Total Number of Communities | 20 |
| Total Population (1960) | 323,500 |
| Population in Communities With Sewage Treatment Plants | 315,000 |
| Population Connected to Sewers and Treatment Plants | 250,000 |
| Number of Communities With Sewer Systems | 15 |
| Number of Communities With Treatment Plants | *15 |
| Type of Treatment (All Have Facilities for Chlorination) | |
| Primary | 3 |
| Secondary | **12 |

*Includes three communities who contract with other communities for sewage treatment.

**Three communities each have two secondary type plants.

All except four of these communities have adequate sewage collection and treatment works to meet the requisites of Michigan statutes. Three of these are under Court order to abate pollution, two are improving existing treatment facilities and the third is building a connection to the Detroit system. The remaining community, a city of about 1,500 population, is considering the addition of secondary treatment.

In the five communities without sewers or sewage treatment works the total population is about 7,000. Sewage disposal is by septic tanks and soil absorption on individual properties.

## Almont

The village has a population of 1,279 (1960) of which 1,250 are connected to the municipal sewerage system. About half of the community is served by separate sanitary sewers, the remainder of the served area being connected to combined sewers.

Pollution control was established in 1958 when a secondary type sewage treatment plant consisting of trickling filters and effluent disinfection was completed, as urged by the Michigan Department of Health and the Water Resources Commission.

Existing facilities are adequate and have reserves for an additional population of 300.

## Armada

The village has a population of 1,111. Virtually all occupied properties are served by a combined sewer system.

Pollution control was established in 1957 when a secondary type sewage treatment plant consisting of trickling filters and effluent disinfection was completed, as urged by the Michigan Department of Health and the Water Resources Commission.

Existing facilities are adequate and have reserves for an additional population of 400.

**Center Line** (see also Detroit Table II)

The city has a population of 10,164 (1960), virtually all of which is served by a system of combined sewers, about one-half of which discharge into the South Macomb Sanitary District system, with treatment provided in the Detroit Sewage Treatment Plant.

Conversion of the entire municipal sewer system to a separate sanitary type and construction of trunk sewers and pumping facilities to discharge the entire municipal sewage flow directly to the Detroit system for treatment is now under way in accordance with an Order of the Water Resources Commission affirmed by a Circuit Court Order issued August 1, 1960. Upon completion of this construction, expected by December 1, 1962, pollution control facilities will be adequate and have reserves for a population of 5,000.

**Clarkston**

The village has a population of 769. Only the business section is served by sewers. These are separate sanitary type. The remainder of the community utilizes private on-property septic tank type sewage disposal systems.

Pollution control facilities consist of septic tank followed by sand filters with undisinfected effluent discharged to a small tributary of the Clinton River. Disinfection currently under consideration. No reserves for additional connections are available in the existing treatment facilities.

Clinton Township

The township has a population of 25,688 (1960). Two separate portions of the township, with a combined population of about 12,000, are served by systems of separate sanitary sewers which also serve a population of about 5,000 in the City of Frazer. The remainder of the township utilizes private, on-property septic tank type sewage disposal systems.

Pollution control facilities consist of two separate secondary type sewage treatment plants consisting of trickling filters with effluent disinfection.

The existing facilities are adequate with reserves for an additional population of 19,000.

Fraser

The city has a population of 7,027 (1960). About 70 percent of the community is served by a system of separate sanitary sewers, the remainder utilizing private on-property septic tank type sewage disposal systems.

Pollution control consists of connection of the sanitary sewer system to the Clinton Township system, described elsewhere in this report.

Lake Angelus

The village has a population of 231 (1960. The community has no formal sewer system and utilizes private on-property septic tank type sewage disposal systems.

Lake Orion

The village has a population of 2,698 (1960). The community has no formal sewer system and utilizes private on-property septic tank type sewage disposal systems.

Leonard

The village has a population of 391 (1960). The community has no formal sewer system and utilizes private on-property septic tank type sewage disposal systems.

Mt. Clemens

The city has a population of 21,016 (1960). Virtually all properties within the city are served by the combined sewer system.

Pollution control was established in 1951 when a secondary type sewage treatment plant consisting of trickling filters with effluent disinfection was completed.

Existing facilities are inadequate with no reserves for additional growth.

Orchard Lake

The village has a population of 1,127 (1960). The community has no formal sewer system and utilizes private on-property septic tank type sewage disposal systems.

Oxford

The village has a population of 2,357 (1960). The community has no formal sewer system and utilizes private on-property septic tank type sewage disposal systems.

**Pontiac**

The city has a population of 82,233 of which about 75,000 are connected to the sewer system. Two-thirds of the system is of the separate sanitary type, the remainder being combined sewers. Several large industries discharge sanitary and industrial wastes to the system.

Pollution control was established in 1921 by the construction of a secondary type sewage treatment plant consisting of Imhoff tanks and trickling filters. Some additions were completed in 1929. Additional facilities, including activated sludge and effluent disinfection, were completed in 1940. Further additions to relieve overloads were completed in 1953, under an Order issued by the Water Resources Commission in1951. Construction of a new sewage treatment plant to supplement the existing plant was commenced in the spring of 1961 in conformity with a Circuit Court Decree issued November, 1960 affirming the defaulted Order of the Water Resources Commission issued August, 1959.

When the additions now under construction are completed (estimated June, 1963) pollution control facilities will be adequate and will have reserves for a population of 40,000.

**Rochester**

The village has a population of 5,431. Virtually all occupied properties are connected to the combined sewer system. The system also collects sanitary sewage and industrial wastes from industries, located both within and outside of the corporate limits, having a population equivalent of about 3,000.

Pollution control was established in 1940 when a primary type sewage treatment plant with effluent disinfection was completed to serve a population of 6,500. Expansion of the plant and addition of secondary treatment consisting of activated sludge was commenced early in 1961 and completed early in 1962 in conformity with requirements of the Michigan Department of Health.

Existing facilities are adequate and have reserves for an additional population of about 10,000.

**Romeo**

The village has a population of 3,327 (1960) which is virtually all served by the sewer system. About 90 per cent of the sewers are of the separate sanitary type and the remainder are combined.

Pollution control was originally established in 1925 when a primary type sewage treatment plant consisting of Imhoff tanks was completed. Addition of disinfection facilities was completed in 1937.

When additions to the sewage treatment works including trickling filter type secondary treatment facilities and the separation of the sewer system are completed as required by the Order of the Circuit Court issued February 19, 1962, pollution control facilities will be adequate and will have reserves for a population of 1,675.

## Sterling Township

The township has a population of 14,622 (1960). Two separate portions of the township, with a combined population of about 10,000, are served by systems of separate sanitary sewers. The remainder of the area utilizes private, on-property septic tank type sewage disposal systems.

Pollution control facilities consist of two secondary type sewage treatment plants, each with effluent disinfection. One of these plants is of the activated sludge type, the other is of the trickling filter type (now being enlarged and converted to activated sludge).

The existing facilities are adequate with present reserves for a population of 7,000. When the present construction work is completed (estimated to be June, 1962) reserves will exist for a population of 12,000.

## Sylvan Lake

The city has a population of 2,004 (1960), virtually all of which is connected to a system of separate sanitary sewers discharging to the City of Pontiac's municipal sewer system with treatment provided at the Pontiac Municipal Sewage Treatment Works, described elsewhere in this report.

Utica

The village has a population of 1,454 (1960), virtually all being connected to the combined sewer system.

Pollution control was originally established in 1938 with the construction of a primary type sewage treatment plant with effluent disinfection. This plant was expanded in 1950.

Secondary sewage treatment facilities are needed, thus the existing facilities are inadequate. No reserves exist for additional connections.

Warren

The city has a population of 89,246 (1960), virtually all of which is served by the sewer system. About 85 percent of the system is of the separate sanitary type, the remainder being combined.

Pollution control was established in 1959 with the completion of a secondary type sewage treatment plant consisting of activated sludge with effluent disinfection as urged by the Michigan Department of Health and the Water Resources Commission.

Existing facilities are adequate with reserves for a population of 30,000.

## Waterford Township

The township has a population of 47,107 (1960). Two portions of the township, with a combined population of about 1,300, are served by systems of separate sanitary sewers. Pollution control facilities for these two portions consist of two secondary type sewage treatment plants, each consisting of trickling filters, and sand filters with effluent disinfection.

Both of these existing facilities are adequate with no reserves for additional connections.

A third portion of the township, with a population of about 5,000, is served by a system of separate sanitary sewers which discharge into the City of Pontiac sewer system with treatment provided at the Pontiac Municipal Sewage Treatment Plant, described elsewhere in this report.

The remainder of the township utilizes private on-property septic tank type sewage disposal systems.

## Huron River

The municipal sewerage facilities existing today in the 17 municipalities located along the river from mouth to headwaters are summarized in Table XIII.

Table XIII

| | |
|---|---|
| Total Number of Communities | 17 |
| Total Population (1960) | 147,000 |
| Population in Communities with Sewage Treatment Plants | 140,000 |
| Number of Communities With Sewer Systems | 12 |
| Number of Communities With Sewage Treatment Plants | 12 |
| Total Number of Sewage Treatment Plants | 14 |
| Type of Treatment (All Have Facilities for Chlorination) | |
| Primary | 4 plants |
| Secondary | 10 plants<br>(8 communities) |

The facilities for pollution control are adequate to meet the requirements of Michigan statutes in all except three of the communities. Each of these have contracted with Wayne County for expansion and improvement of treatment facilities, scheduled for construction this year.

The five communities without formal sewer systems have a total population of about 7,000. Sewage disposal is by septic tanks and soil absorption.

Ann Arbor

The city has a population of 67,340. Virtually all occupied properties are connected to the sanitary sewer system.

Pollution control was established originally in 1936 when a secondary type treatment plant was completed. Additions to the plant were made in 1951. Treatment consists of activated sludge and effluent disinfection and is adequate. The plant is approaching capacity and an engineering report has been completed outlining a program for plant expansion which will serve future needs of the city.

## Belleville

The city has a population of 1,921. Virtually all occupied properties are connected to the sanitary sewer system.

Pollution control was established in 1940 when a primary type treatment plant with effluent disinfection was completed by Wayne County for use by the city.

Existing facilities are inadequate. Correction was ordered by the Water Resources Commission in 1956 affirmed by Decree of the Circuit Court in 1957. The city in March, 1962 again contracted with Wayne County for sewage disposal service. The county plans to complete an interceptor from its Wyandotte plant to Belleville by July, 1963. When this interceptor is completed the existing plant serving the city will be abandoned and pollution control will then be adequate.

## Brighton

The city has a population of 2,282. Virtually all occupied properties are connected to the sanitary sewer system.

Pollution control was established in 1940 when a trickling filter type treatment plant with effluent disinfection was completed. In 1958 the plant was enlarged to meet the future needs of the city.

The existing facilities are adequate for an additional population of 2,500.

Chelsea

The village has a population of 3,355. Virtually all occupied properties are connected to the sanitary sewer system.

Pollution control was established originally in 1937 when a secondary type treatment plant was completed. In 1960 additions to the treatment plant were completed in conformity with an agreement with the Michigan Department of Health.

Treatment consists of activated sludge and effluent disinfection which are adequate for an additional population of 1,000.

Dexter

The village has a population of 1,702. Virtually all occupied properties are connected to the sanitary sewer system.

Pollution control was established originally in

1936 when a primary type treatment plant was completed. In 1937 effluent disinfection facilities were added. Existing facilities are up to capacity and plans and specifications have been approved for plant expansion. The village is presently making arrangements to finance the plant enlargement.

### Flat Rock

The city has a population of 4,696. Virtually all occupied properties are connected to the sewer system. Approximately 30 percent of the occupied properties are connected to combined type sewers and the remainder to separate type sewers.

Pollution control was established in 1940 when a primary type treatment plant with effluent disinfection was completed by Wayne County for use by the city.

Existing facilities are inadequate; however, plans are completed for the expansion of the plant and construction is expected to commence prior to May 1, 1962 and be completed in 1963. Combined sewer overflows are under continuing surveillance by the Michigan Department of Health to determine the need for additional control beyond that presently provided.

### Milford

The City has a population of 4,323. Virtually all occupied properties are connected to the sanitary sewer system.

Pollution control was established in 1936 when an Imhoff tank was completed. The plant was expanded and a trickling filter and effluent disinfection were added in 1952 in compliance with an Order of the Water Resources Commission adopted November, 1950. The existing facilities are adequate but there are no reserves. The city had an engineering report prepared outlining the manner that the plant will be expanded when the need arises.

Pinckney

The population of the village is 732. No formal public sewer system exists. Most occupied properties are served by private sewage disposal systems consisting of septic tank and tile field.

Rockwood

The city has a population of 2,026. Virtually all occupied properties are connected to the combined sewer system.

Pollution control was established in 1940 when a primary type treatment plant with effluent disinfection was completed by Wayne County for use by the city. Existing facilities are inadequate. Improvements are scheduled for construction by the county in 1963.

Combined sewer overflows are under continuing surveillance by the Michigan Department of Health to determine the need for additional control beyond that presently provided.

Romulus Township

The population of the township is 3,500. Approximately 2,000 are served by sanitary sewers and a trickling filter type treatment plant with effluent disinfection operated by Wayne County. The Detroit Wayne County Airport is served by a county operated activated sludge type treatment plant with effluent disinfection. The township on March 7, 1962 contracted with Wayne County for expanded sewerage service. The county plans to complete an interceptor from their plant at Wyandotte through the township by July, 1963. This interceptor will provide service for almost the entire township and make it possible to abandon the two existing plants.

South Lyon

The City has a population of 1,753. Virtually all occupied properties are connected to the sanitary sewer system.

Pollution control was established in 1939 when an activated sludge type plant was completed. In 1960 the plant was enlarged and effluent disinfection added in conformity with an agreement with the Michigan Department of Health. Treatment facilities are adequate for an additional population of 3,000.

South Rockwood

The population of this village is 1,337. No formal public sewer system exists. Most occupied properties are served by private sewage disposal systems consisting of septic tank and tile field.

Stockbridge

The population of this village is 1,097. No formal public sewer system exists. Most occupied properties are served by private sewage disposal systems consisting of septic tank and tile field.

Wixom

The population of this city is 1,531. No formal public sewer system exists. Most occupied properties are served by private sewage disposal systems consisting of septic tank and tile field.

Wolverine Lake

The population of this village is 2,404. No formal public sewer system exists. Most occupied properties are served by private sewage disposal systems consisting of septic tank and tile field.

Ypsilanti

The city has a population of 20,957. Virtually all occupied properties are connected to the sewer system. Approximately 20 percent of the occupied properties are connected to combined type sewers and the remainder to separate type sewers.

Pollution control was established in 1939 when a primary type treatment plant with effluent disinfection was completed. In conformity with an agreement with the Michigan Department of Health construction of additions including activated sludge type treatment are now in progress and expect to be completed by September, 1963. The expanded plant will be adequate for an additional population of 10,000. Combined sewer overflows are under continuing surveillance by the Michigan Department of Health to determine the need for additional control beyond that presently provided.

### Ypsilanti Township

The township has a population of 25,900. Approximately 23,000 people are connected to the sanitary sewer system.

In 1944 the U.S. Government constructed in the township sanitary sewers and two activated sludge type treatment plants with effluent disinfection. After World War II these facilities were purchased by the township.

Existing facilities are adequate and have a limited reserve. The township has plans completed for making additions to one plant which will make it possible to abandon the other plant and provide some additional treatment capacity for future growth. A Court action has been filed against the township by downstream riparians. Construction of the plant additions is being delayed because bonds cannot be sold with litigation pending. This work will commence as soon as the litigation is terminated.

## Raisin River

The municipal facilities for sewage collection and treatment in the 16 communities located along the Raisin River and its branches from mouth to headwater are summarized in Table XIV.

Table XIV

| | |
|---|---|
| Total Number of Communities | 16 |
| Total Population (1960) | 67,000 |
| Population in Communities With Treatment Plants | 62,000 |
| Number of Communities With Sewer Systems | 9 |
| Number of Communities With Treatment Plants | 9 |
| Type of Treatment (All Have Facilities for Chlorination) | |
| Primary | 4 |
| Secondary | 5 |

The facilities for pollution control are adequate to meet requisites of the Michigan statutes at all plants and have reserves for expansion at all except one.

In the seven communities without sewer systems total population is about 5,000. Sewage disposal is by septic tanks and soil absorption.

Adrian

The city has a population of 20,347. About 90 percent of the occupied properties are connected to the sewer system. About half of the sewered population is served by separate sanitary sewers, the remainder being connected to combined sewers.

Pollution control was established originally in 1926 when a primary type sewage treatment plant was completed. Secondary treatment was added in 1939 by Order of the Stream Control Commission and expanded in 1951 in conformity with an Order of the Water Resources Commission affirmed by Circuit Court Decree. Treatment consists of activated sludge and effluent disinfection. The plant has reserves for a population of 5,000. Combined sewer overflows are under continuing surveillance by the Michigan Department of Health to determine the need for additional control beyond that presently provided.

Blissfield

The village has a population of 2,653. Virtually all occupied properties are connected to the combined sewer system.

Pollution control was established in 1957 when a primary type sewage treatment plant with effluent disinfection was completed in conformity with an Order of the

Water Resources Commission adopted September, 1951. Existing facilities are adequate and have reserves for an additional population of 1,500. Combined sewer overflows are under continuing surveillance by the Michigan Department of Health to determine the need for additional control beyond that presently provided.

Britton

The population of this village is 622. No formal public sewer system exists. Most occupied properties are served by private sewage disposal systems consisting of septic tank and tile field.

Brooklyn

The population of this village is 986. No formal public sewer system exists. Most occupied properties are served by private sewage disposal systems consisting of septic tank and tile field.

Cement City

The population of this village is 471. No formal public sewer system exists. Most occupied properties are served by private sewage disposal systems consisting of septic tank and tile field.

Clayton

The population of this village is 470. No formal public sewer system exists. Most occupied properties are served by private sewage disposal systems consisting of septic tank and tile field.

Clinton

The village has a population of 1,481. Virtually all occupied properties are connected to the separate sewer system.

Pollution control was established in 1942 when a primary type treatment plant with effluent disinfection was completed. Existing facilities are adequate and have reserves for an additional population of 200.

Deerfield

The population of this village is 866. No formal public sewer system exists. Most occupied properties are served by private sewage disposal systems consisting of septic tank and tile field.

Dundee

The village has a population of 2,377. Virtually all occupied properties are connected to the combined sewer system.

Pollution control was established in 1958 when a primary type sewage treatment plant with effluent disinfection was completed in conformity with an Order of the Water Resources Commission adopted 1951 and affirmed by Circuit Court Decree dated May, 1956. Existing facilities are adequate and have reserves for an additional population of 1,000. Combined sewer overflows are under continuing surveillance by the Michigan Department of Health to determine the need for additional controls beyond that presently provided.

Manchester

The village has a population of 1,568. Virtually all occupied properties are connected to the combined sewer system.

Pollution control was established in 1957 when a secondary type sewage treatment plant consisting of trickling filters and effluent disinfection was completed in conformity with an Order of the Water Resources Commission adopted 1951 and affirmed by Circuit Court Decree. Existing facilities are adequate and have reserves for an additional population of 800. Combined sewer overflows are under continuing surveillance by the Michigan Department of Health to determine the need for additional controls beyond that presently provided.

Milan

The village has a population of 3,616. Virtually all occupied properties are connected to the combined sewer system.

Pollution control was established in 1954 when a secondary type sewage treatment plant consisting of trickling filters and effluent disinfection was completed in conformity with an Order of the Water Resources Commission adopted 1951. Existing facilities are adequate and have reserves for an additional population of 400. Combined sewer overflows are under continuing surveillance by the Michigan Department of Health to determine the need for additional controls beyond that presently provided.

### Monroe

The City of Monroe has a population of 22,968. Virtually all occupied properties are connected to the sewer system. Approximately 40 percent of the occupied properties are connected to combined type sewers and the remainder to separate type sewers.

Pollution control was established in 1937 when a primary type sewage treatment plant with effluent disinfection was completed. Existing facilities are adequate and have reserves for an additional population of 2,000. Combined sewer overflows are under continuing surveillance by the Michigan Department of Health to determine the need for additional controls beyond that presently provided.

### Onsted

The village has a population of 526. About 50 percent of the occupied properties are connected to the combined sewer system.

Unlawful pollution has not been demonstrated; however, the village has completed an engineering report setting forth the means by which a sewerage system and treatment would be provided.

## Petersburg

The population of this village is 1,018. No formal public sewer system exists. Most occupied properties are served by private sewage disposal systems consisting of septic tank and tile field.

## Saline

The village has a population of 2,334. Virtually all occupied properties are connected to the sewer system. Approximately 20 percent of the occupied properties are connected to combined type sewers and the remainder to separate type sewers.

Pollution control was established originally in 1956 when a trickling filter type sewage treatment plant with effluent disinfection was completed in conformity with an Order of the Water Resources Commission adopted in 1951. Existing facilities are reaching capacity and the village has been notified by the Michigan Department of Health to commence planning plant additions.

## Tecumseh

The city has a population of 7,045. Virtually all occupied properties are connected to the sanitary sewer system.

Pollution control was established in1953 when a trickling filter type treatment plant with effluent disinfection was completed in conformity with an Order of the

Water Resources Commission adopted in 1949. Existing facilities are adequate and have reserves for an additional population of 400.

## Lake St. Clair

Waste discharges to Lake St. Clair consist of the effluent from the sewage treatment plant at New Baltimore, residual pollutants in the tributary streams and St. Clair River and the overflows from the combined sewer systems of the South Macomb Sanitary District and the Milk River Drainage District. The tributary streams are the Salt River and Clinton River. The Salt River is not within the scope of this report. The Clinton River has been discussed under a previous section.

### New Baltimore

The city has a population of 3,159 (1960), virtually all of which is served by a system of separate sanitary sewers.

Pollution control was established in 1961, with completion of a secondary type sewage treatment plant consisting of a trickling filter with effluent disinfection, as urged by the Michigan Department of Health. The existing facilities are adequate with reserves for a population of 3,000.

### Milk River Drainage District

Until the summer of 1960 the sewage and storm water of the City of Grosse Pointe Woods was discharged to Milk River during periods of runoff. The storm water and some sewage from the City of Harper Woods also was discharged to this stream. Inadequacies in capacity of the system resulted in flooding of basements in Grosse Pointe Woods with mixtures of sewage and storm water during wet weather periods. These conditions were found by the State Health Commissioner in 1954 to create a menace to public health and a public nuisance.

Facilities completed in 1960 by the Intercounty Drainage Board of Wayne and Macomb Counties were installed, at the urging of the Michigan Department of Health, to control these health hazards and nuisances. They consist of enclosure of a major portion of Milk River, thereby providing an adequate outlet for the combined sewer system of Grosse Pointe Woods and a combination of facilities for retention, storage and treatment of the excess flows from such system during period of surface runoff.

As described earlier under Wayne County-Northeast Interceptor District, the sanitary sewage flow is intercepted to Detroit for treatment, thereby providing adequate control of pollution during dry weather periods. The facilities for treatment of the overflows from the system during wet weather are under the continuing surveillance of the Michigan Department of Health to determine the need for additional control beyond that presently provided.

South Macomb Sanitary District

As stated previously under Wayne County-Northeast Interceptor District, the South Macomb Sanitary District and its constituent municipalities stipulated in 1960 to provide facilities by September, 1963 adequate to control pollution from the overflows of combined sewer system which presently are discharged to Lake St. Clair. Plans for such facilities for a portion of the area have been completed. Financing the project is currently delayed by Court action contesting assessments.

## Lake Erie

Wastes discharged to Lake Erie consist of the residual pollution from the Detroit River and tributary streams together with some shoreline pollution from unsewered areas. The principal tributary streams in Michigan are the Huron River and Raisin River discussed previously in this report. Minor tributaries are Sandy, Stony and Swan Creeks.

Carleton

The village has a population of 1,379. No formal public sewer system exists. Most occupied properties are served by private sewage disposal systems consisting of septic tank and tile field.

Plans are being prepared for the development of a public sewerage system and treatment plant. Means of financing the project are also being evaluated.

Estral Beach

The population of this village is 254. No formal public sewer system exists. Most occupied properties are served by private sewage disposal systems consisting of septic tank and tile field.

Maybee

The population of this village is 459. No formal public sewer system exists. Most occupied properties are served by private sewage disposal systems consisting of septic tank and tile field.

I would like to ask that this additional statement be incorporated in the record.

DR. HEUSTIS: Would the proper place for this be at the end of Chapter II?

MR. PIERCE: That is correct.

DR. HEUSTIS: The following statement will be incorporated in the written record, then.

MR. PIERCE: Thank you.

A report completed this month, March 1962, by the City of Monroe, makes provision for treatment in its plant of sewage collected from the developed shoreline properties in Frenchtown Township.

A program is being developed in the township to provide lateral sewers in these areas to be connected to the City of Monroe for treatment. This is a partial solution to a problem that was discussed yesterday, and it is well recognized in the area that shoreline property both in Monroe County and in the counties to the north, the counties of Wayne, Macomb, and St. Clair, the unincorporated areas do not have adequate facilities in many instances to provide the requisite protection to the receiving waters. In several of these areas plans are underway for the development of lateral sewers and treatment works where the population is sufficiently dense to make this possible and practicable from a financial standpoint.

One of these areas is Frenchtown Township, a township lying directly north, in this area, north of the City of Monroe, and which very naturally can connect to the city where the sewage can be treated and discharged into the Raisin River. Much more work needs to be done in several of these other areas in the other counties, and is under continuing evaluation, and surveillance both by the County Health Departments in these areas and by the state regulatory agencies.

Mr. Chairman, this completes Chapter II.

DR. HEUSTIS: Thank you. Mr. Oeming, will you continue with Chapter III.

MR. VOGT: I would like to summarize.

DR. HEUSTIS: Oh, I beg your pardon. Briefly.

MR. VOGT:

Accomplishments

During the last ten years nearly all of the communities in the five river and two lake basins covered by this report have been active in developing improved facilities for control of pollution discharged to these waters. Today every city, village and township, having a sewer system, has either a sewage treatment plant of its own or contracts with another governmental unit for treatment of its collected wastes. For many years no proposed sewer has been authorized by the State Health Commissioner for construction unless adequate provision has been made for treatment of the wastes so collected. Of a population of approximately 3,500,000 living in developed sections of this area, less than two percent live in municipalities having no sewer system. In most communities nearly all of the population is connected to the sewer system. Thus it is apparent that virtually all of the sewage from residential areas, except in small scattered developments, is being treated currently in municipally owned sewage treatment plants.

Adequacy of Facilities

There are no other municipal projects outstanding where actionable violations of the requisites of the Michigan pollution control statutes have been officially recognized or identified by either agency. Two communities covered in previous sections currently are planning to install additional treatment facilities without formal action by either agency.

The extent of adequacy or completeness of compliance with statutory requirements is constantly being appraised by the staffs of the two agencies. The dynamic nature of a mobile and expanding population, and industry continually changes the relationship between pollutional loadings on the stream, resultant water quality and water objectives. That these changing needs have been recognized and are being met is evident from the large number of communities and industries which have installed or are scheduling the installation of additions to existing treatment or control facilities (see especially column 2 of Table XV). The term "additions" is used here to differentiate between the original facilities designated as "new" and those expanded in capacity or to which secondary treatment is added. It is significant to note also that nearly all of the treatment plants and interceptor systems, except those under construction or scheduled for construction, have rather substantial reserves in capacity. A few like the Evergreen-Farmington Interceptor in Oakland County have reserves sufficient for ultimate population, in this instance about 275,000.

## Combined Sewers

Measures taken in relation to combined sewers fall into three categories, namely: elimination, treatment of overflows and continuing appraisal of the need for or nature of controls required.

Throughout this area most newly developing communities are building separate type sewer systems. In many of these areas this required a radical departure from established practice. Except for the Cities of Detroit and Dearborn and a few adjacent communities almost completely served now with combined sewers, practically all of the area has initiated and will continue to build separate systems.

At Farmington and Grosse Pointe Woods-Harper Woods, facilities have been completed during the last two years for storage, retention and treatment of excess flows from combined sewer systems in wet weather. Both the South Macomb Sanitary District and the Southeastern Oakland County communities have projects for similar controls ready for construction.

In all other areas, both in small communities on the small streams and the communities on the shore of the Detroit River, the two agencies keep the overflows from such systems under continuing surveillance and investigation.

## Work Yet To Be Done

Needs which have been identified and determined are listed in Tables XV and XVII and identified under Status of Compliance as "commenced" or "scheduled 1962," in the former Table and as "not demonstrated" or "additions required" in the latter. All of the municipal projects should be completed in 1963. No other unsatisfied municipal needs are known, except at two small communities previously mentioned where the projects for expansion are in the planning stage.

It is significant that all of these projects are for additions to existing systems. Most of these are for ultimate development of the service area.

The majority of the municipal projects involve relief to a common interceptor or additions to a treatment plant serving several communities -- usually ten to fifteen in one project. The complexities of apportioning the costs, arranging the financing and completing contractual arrangements among these governmental units tends to delay the project substantially, compared with one serving a single community. The need for all of these projects was accepted by the communities from three to five years ago. Each of these projects is now assured. Several are under construction and the rest are to be commenced this year. Chief among the currently outstanding problems of industrial waste disposal, which have not been fully evaluated to establish the extent of corrective measures required, is the dissolved oxygen deficiency and bacterial contamination caused in the lower Raisin River by the paper mills at Monroe. Developments expected to mature in 1962 will have a materially beneficial effect on the present river conditions as measured by these parameters.

Investigation and appraisal of pollutional discharges from all sources is a continuing process. What is satisfactory today in relation to water quality objectives and uses of receiving waters may be inadequate or unsatisfactory tomorrow. The staffs of the two agencies continually appraise the magnitude and quality of pollutional discharges, both present and impending. Their present effect upon resources and uses of the receiving waters is examined and evaluated. As additional controls are found to be necessary to meet the requisites of Michigan statutes, such facilities will be required.

Thank you.

THE CHAIRMAN: Thank you.

DR. HEUSTIS: Thank you very much. Mr. Oeming.

FURTHER STATEMENT OF LOWRING F. OEMING,
CHIEF ENGINEER, WATER RESOURSES COMMISSION,
STATE OF MICHIGAN

MR. OEMING: Mr. Chairman, and conferees. We would like to point out that the report which has been presented to the conferees will be available to anyone in the audience who wishes one following the conclusions of my remarks. These gentlemen will have more reports out here so see them and get your copies. We think we have enough to cover everyone in the room if everyone wants only one copy. If we run out we will have copies assembled at Lansing, and if you will see Ron Crane -- if you will stand up so people can see you -- he will take your name and address so you will get a copy in the mail.

## CHAPTER III. INDUSTRIAL WASTE TREATMENT AND CONTROL.

The majority of the industries in the basin dispose of their wastes into the public sewage collection systems described in Chapter II. In these cases, responsibility for control of industrial wastes together with the sanitary sewage rests with the municipality. Those industries discharging wastes separately to watercourses through company owned sewers have a direct obligation to the Commission to comply with the Water Resources Act.

A program to control wastes from the latter class of industries on the Detroit River was initiated by the Michigan Stream Control Commission at a conference with these industries in May, 1946. This conference concluded with the issuance by the Commission of a statement describing the controls which it desired to attain. This statement has served as the basis for much of the pollution control activity pursued by the Commission staff up until the present, modified only as required by the Objectives, adopted by the International Joint Commission in its report to the governments of United States and Canada in 1951. As an important adjunct to this program, the Commission through its staff, has developed and issues an annual industrial Pollution Status Report. All industries discharging wastes directly to the waters of the state are listed and each is assigned a rating on the degree of control maintained during the preceding year. Thedegree of control is evaluated in relation to the statutory test of unlawful pollution as defined in the Water Resources Act (Act 245, P.A. 1929, as amended). Each industry rated receives a copy of the entire status report, providing a continuing record by which it can measure its accomplishments and can compare its progress with others.

In the river basins of southeastern Michigan, ratings were assigned on April 1, 1961, to 104 separate problems in a total of 93 industrial establishments.

The succeeding portion of this Chapter identifies each of these sources of industrial waste discharges; describes in general terms the principal waste constituents; recites the types of actions taken by the Water Resources Commission and its predecessor Stream Control Commission to attain control; and shows the rating assigned to each at the present time.

**ALLIED CHEMICAL CORPORATION** operates four separate manufacturing plants discharging wastes to the lower Rouge and Detroit Rivers:

The General Chemical Division is located in the City of River Rouge. Operations produce cooling waters which are normally unchanged in the process except for rise in temperature. Wastes flow to the Rouge River Short Cut Canal. Cooling is by the indirect method. Prevention of product leaks to the sewer is maintained by continuous automatic monitoring within the plant. Sanitary sewage is disposed of by subsurface percolation methods on the plant premises with no direct discharge to the river. Control of wastes is rated as adequate.

Plastics and Coal Tar Division is located in the City of Detroit. Wastes are produced from the processing of coal tars and are discharged to the Old Rouge River Channel. Following request by the Michigan Stream Control Commission in 1947, measures were taken to reduce waste flows, to restrict phenols, oils, tars and ammonia and to eliminate raw sewage discharges. Reduction in waste volume was attained by process changes. Oil and tar bearing wastes are treated in gravity type separators. Restriction of phenols was attained in 1955 by installation of a solvent extraction system which yielded 94% reduction with accompanying reduction in ammonia. Sanitary sewage segregated and connected to the Detroit system since 1947. Control of wastes is rated as adequate.

Semet-Solvay Division is located in the City of Detroit. Wastes are produced from operations of a by-product coke oven plant and discharged to the Old Rouge River Channel. Following request by the Michigan Stream Control Commission in 1947, measures were taken to restrict phenols, oil and ammonia and to eliminate raw sewage discharges. Oil and ammonia are controlled by recovery methods within the plant. Restriction of phenols by a solvent extraction system was instituted in 1957, accomplishing 95 percent reduction. Sanitary sewage segregated and connected to Detroit system since 1949. Control of wastes is rated as adequate.

Solvay Process Division is located in the City of Detroit. The principal waste constituents produced are inert calcium carbonate solids in suspension, chlorides and ammonia in solution and lubricating oils. Following request by the Michigan Stream Control Commission in 1947, measures were taken to improve the removal of solids, reduce oil losses and eliminate raw sewage discharges. Solids discharges are presently treated in settling facilities on Zug Island. Effluents are discharged to Detroit River and Old Channel of Rouge River. Control of oil and ammonia discharges is maintained by operating procedures within the plant. Segregation of sanitary sewage and connection to Detroit system was provided in 1949. Control of wastes is rated as adequate.

AMERICAN CEMENT CORPORATION

The Peerless Cement Division is located in the City of Detroit. Wastes are produced from the production of cement and are discharged to the Old Channel of Rouge River. Control measures were initiated following an evaluation by the Michigan Stream Control Commission of the solids content of the wastes. These solids originated from the collection of dust and ash. They have been virtually eliminated from the discharges since 1954 when dry methods of collection were installed to replace wet methods of washing stack gases. Present waste discharges consist mainly of cooling waters and clay filtrate. Sanitary sewage is connected to the Detroit system. Control of wastes is rated as adequate.

ANACONDA AMERICAN BRASS COMPANY is located in the City of Detroit. Wastes are produced from copper and brass casting and rolling operations and flow into Detroit River. Measures were taken upon request of the Michigan Stream Control Commission to restrict oils, to control acids and to eliminate raw sewage discharges. Oils are removed in gravity type separators, acid wastes are segregated and neutralized. Sanitary sewage segregated and connected to the Detroit system since 1947. Control of wastes is rated as adequate.

ANDERSON CHEMICAL COMPANY is located in Fairfield Township, Lenawee County. Wastes originate from chemical compounding operations and flow to Black Creek, a tributary of Raisin River. Restrictions and conditions on the acidity-alkalinity range, on solids, oil and oxygen consuming content of the process wastes and on sanitary sewage were established by a new use Order of Determination issued January 21, 1960 by the Water Resources Commission. Control facilities were installed coincident with start of manufacturing operations employing equalization and settling in an earthen basin. Sanitary sewage is disposed of by subsurface percolation on company premises with no direct discharge to the river. Adequacy of process waste control has not been fully demonstrated.

ARCHER-DANIELS-MIDLAND COMPANY is located in the City of Wyandotte on the Pennsalt Manufacturing Company premises. Wastes are produced from the manufacture of hydrogenated glycerides and fatty acids and are discharged to Detroit River. Measures were taken upon request by Michigan Stream Control Commission in 1947 to reduce the content of oils and fatty acids in the discharges and to eliminate raw sewage discharges. Treatment system for process wastes, expanded in 1949, consists of gravity type oil-water separators. Sanitary sewage segregated and connected to Detroit system since 1947. Control of wastes rated as adequate.

ARGUS CAMERA is located in Ann Arbor. Wastes originate from electroplating operations and are discharged to Allen Creek Drain, a tributary to the Huron River. A new use Order of Determination issued by the Water Resources Commission on January 20, 1955 restricted the acidity-alkalinity range, cyanide, metallic ions, solids and oils. Facilities for treatment and control of these substances is connected to the Ann Arbor municipal sanitary system. Control of wastes is rated as adequate.

BELLEVILLE PLATING COMPANY is located in Van Buren Township, Wayne County. Wastes originate from electroplating operations and are discharged to Huron River. Discharges are required to meet restrictions on acidity, alkalinity, oils, cyanide, toxic metals and sewage by a new use Order of Determination issued by the Water Resources Commission on May 28, 1958. Treatment and control methods necessary to meet the Order requirements were provided coincident with start of plating operations. Sanitary sewage is disposed of by subsurface percolation methods on company premises with no direct discharge to the river. Control of wastes is rated as adequate.

THE BRIGGS MANUFACTURING COMPANY is located in Sterling

Township, Macomb County. Wastes originate from stamping and porcelain coating operations and are discharged to Beaver Creek, a tributary of Clinton River. A new use Order of Determination issued by the Water Resources Commission on September 19, 1956 establishes restrictions on acids and alkalis, iron, oil and grease and settleable solids in the process wastes discharges and prescribes quality of sanitary sewage effluents. Treatment and control methods necessary for compliance with the Order requirements were provided coincident with the start of operations. Sanitary sewage is treated in a secondary type plant with effluent chlorination provided on the company premises. Adequacy of waste control has not been fully demonstrated.

BUCKEYE PRODUCTS CORPORATION is located in the City of Adrian. Wastes originate from electroplating operations and are discharged to the South Branch of Raisin River. In 1953 the Water Resources Commission invoked the statutory procedure to abate pollution created by the wastes. A final Order of Determination issued on June 27, 1954 restricts the chromium, cyanide and copper content and the acidity-alkalinity range of the discharges. Action to enforce compliance with the restrictions was taken in Circuit Court in 1957 resulting in a Court Order restraining the company from violating these requirements. Treatment and control methods necessary to meet these restrictions are now in effect employing chemical oxidation of cyanide and chemical reduction of chromium and neutralization by intermixing of acid and alkaline wastes. Sanitary sewage is connected to the Adrian municipal system. Control of wastes is rated as adequate.

BURROUGHS CORPORATION is located in Plymouth Township, Wayne County. Disposal of wastes to Rouge River is limited to cooling waters which are unchanged by the manufacturing operations except for a rise in temperature. Process wastes and sanitary sewage are connected to the Wayne County system. Control of wastes is rated as adequate.

CHRYSLER CORPORATION operates five separate manufacturing plants discharging wastes to the Detroit River and Clinton River tributaries:

The Cycleweld Chemical Products Division and Amplex Division are located in the City of Trenton. The Detroit River is used for disposal of cooling waters. No process wastes originating from the production of adhesives, sealers, rust preventatives and powdered metal products enter the river. Sanitary sewage is connected to the Wayne County system. Control of wastes is rated as adequate.

Defense Operations Division is located in Center Line. Wastes originate from the manufacture and assembly of military equipment and are discharged to the Center Line Relief Drain, a tributary to Bear Creek and the Clinton River. Discharges are required to meet restrictions on acidity-alkalinity, cyanide, metallic ions, solids, oils and sewage by a new use Order of Determination issued by the Water Resources Commission on June 19, 1958. Facilities for treatment and control of substances originating in electroplating operations were provided coincident with the start of operations. Primary type facilities for treatment of sewage with effluent chlorination are presently being operated but are to be abandoned in favor of a connection to the Warren municipal system upon completion of negotiations now under way. Control of process wastes and sewage is rated as inadequate, pending connection to municipal system as required by the Order.

Michigan Missile Division is located in Sterling Township, Macomb County. Wastes originate from the electroplating, assembly and testing of metal components for missiles and are discharged to the Lockwood (or Moore) Drain, a tributary to Red Run and the Clinton River. Discharges are required to meet restrictions on acidity-alkalinity, solids, turbidity, cyanide, toxic metals, oil and greases and sanitary sewage by a new use Order of Determination issued by the Water Resources Commission on December 16, 1952. Treatment and control methods necessary for compliance with the Order requirements were provided coincident with the start of operations. Sanitary sewage is treated in a secondary type plant on company premises with effluent chlorination provided. Control of wastes is rated as adequate.

The MoPar Plant is located in the City of Center Line. Wastes originate from automobile parts manufacturing operations and are discharged to the Center Line Relief Drain, a tributary to Bear Creek and the Clinton River. All process wastes and sanitary sewage are treated on the plant premises in a secondary type plant with effluent chlorination. Treatment facilities were provided coincident with start of manufacturing operations. Control of wastes is rated as adequate.

Trenton Engine Plant is located in Trenton. Wastes are produced from the machining and assembly of automobile engines. All process wastes are connected to the Wayne County system after pretreatment for removal of oils. Sanitary sewage is treated in the Wayne County system. Use of the Detroit River for waste disposal is limited to surface water runoff from the plant premises and cooling waters which are unchanged in the process except for a rise in temperature. Oil drainage from outdoor storage and loading of waste metal cuttings is collected and treated prior to release to the county sewer. Control of wastes is rated as adequate.

CONSOLIDATED PAPER COMPANY operates three paper manufacturing plants within the City of Monroe, all of which discharge waste to the Raisin River:

North Side Division. Wastes originate from the manufacture of liner board from waste paper and corrugating medium from straw. Principal waste constituents are paper and straw solids in suspension, oxygen consuming substances and coliform group organisms. Measures were taken upon request of the Water Resources Commission in 1953 to reduce the content of suspended solids in the discharges. Treatment methods employed are coagulation and settling. Sanitary sewage is segregated and connected to the Monroe municipal system. Adequate control of suspended solids has not been demonstrated. Oxygen consuming substances exceed assimilative capacity of the river and seasonal oxygen depletion in the lower river occurs. No measures provided for control of bacteria. Straw processing operation is a major source of coliform group bacteria. Process is to be discontinued in 1962.

South Side Division. Wastes originate from paper board manufacturing operations. Principal waste constituents are paper solids in suspension and oxygen consuming substances. Measures were taken to control the paper solids losses initially at the request of Michigan Stream Control Commission and later to comply with requests of the Water Resources Commission. Restrictions on solids losses and provisions for installation of additional settling facilities were incorporated in a stipulation between the company nad the Water Resources Commission in 1955. A portion of the facilities were rebuilt and expanded facilities installed in 1957. Treatment performance was inconsistent until 1961 when major changes in manufacturing operations were made. Sanitary sewage is segregated and connected to the Monroe municipal system. Oxygen consuming substances exceed assimilative capacity of the river and season oxygen depletion in the lower river occurs.

West Side Plant. Wastes are produced from the manufacture of paperboard. The principal waste constituents are paper solids in suspension and oxygen demanding substances. Measures for control of the paper solids were taken following request of the Michigan Stream Control Commission in 1947. Treatment and control methods in effect are chemical coagulation followed by gravity separation. About three-quarters of treated wastes are re-used in the manufacturing operations. Sanitary sewage is segregated and connected to the Monroe municipal system. Control of the suspended solids is rated as adequate. Adequacy of control of oxygen consuming substances has not been fully demonstrated.

CONTINENTAL MOTORS CORPORATION

Novi Governor Division, located in the City of Novi, conducts machining and heat treating operations for production of automotive parts. Wastes produced are discharged to a small tributary of Rouge River. The principal waste constituents are oils, suspended solids and cyanide. Waste control established at request of the Water Resources Commission. Treatment and control methods employed are settling for solids removal, separation and burning of oils removed by gravity methods and chemical oxidation of cyanides. Control of wastes is rated as adequate.

THE CROSS COMPANY is located in the City of Fraser. Wastes originate from machine tool manufacturing operations and are discharged to Sweeney Drain, a tributary of Clinton River. The new use Order of Determination issued by the Water Resources Commission on January 26, 1956 establishes restrictions on oils and sanitary sewage. Treatment and control methods necessary for compliance with the Order requirements were provided coincident with the start of operations. Secondary type facilities for treatment of sewage with effluent chlorination are provided on company premises. Negotiations are under way to abandon the facility and connect sewage to Clinton Township system for treatment. Control of wastes is rated as adequate.

DANA CORPORATION is located in the City of Ecorse. Wastes are produced from the forming and fabrication of frames for automobiles. An increases use Order of Determination issued by the Water Resources Commission in July, 1950 establishes restrictions on the acid, alkali and oil content of all wastes from this plant. Treatment and control methods required for compliance with the Order requirements were provided coincident with the increased use. Sanitary sewage was segregated and connected to the River Rouge municipal system in 1957 following request by the Water Resources Commission. Present operations produce acid liquors only. Liquors are hauled and disposed of by contract. Control of wastes is rated as adequate.

DARLING AND COMPANY is located in the City of Melvindale. Wastes are produced from rendering operations and are discharged to Rouge River. The principal constituents originating from the operations are fats, greases and solids in suspension and oxygen consuming substances. Control and treatment measures were initiated following a request by the Michigan Stream Control Commission in 1946. Settling and skimming methods are employed for removal of solids, fats and greases from the discharges. Effluents are chlorinated. Sanitary sewage is connected to the Melvindale municipal system. Control of wastes is rated as adequate.

DETROIT EDISON COMPANY. The steam electric portion of the Enrico Fermi Atomic Power Plant is located in Frenchtown Township, Monroe County, adjacent to the Power Reactor Development Company's atomic power reactor. Wastes originating from electric power generating will be cooling waters, demineralizing regenerants and sanitary sewage, and will flow to Lake Erie via Swan Creek. Restrictions and conditions have been established on the alkalinity-acidity range and on the chlorine and radioactivity content of the cooling water discharges and on the quality of sewage effluents by a new use Order of Determination issued December 6, 1956 by the Water Resources Commission. Treatment and control facilities necessary to meet these restrictions have been completed. Sanitary sewage is segregated and is treated in a secondary type plant with chlorination of effluents provided on the premises. Power production awaits completion of atomic reactor (see Power Reactor Development Company).

DETROIT, TOLEDO AND IRONTON RAILROAD COMPANY operates a railroad yard and repair shops in Brownstown Township, Wayne County. Wastes originate during the repair and fueling of diesel engines and are discharged to Silver Creek, a tributary to Huron River. The principal waste constituents are solids, oils and greases. Control and treatment measures were initiated following a request by the Water Resources Commission in 1952. Settling and skimming methods are employed for removal of solids, oil and greases from the discharges. Sanitary sewage is disposed of by subsurface percolation methods on company premises with no direct discharge to the creek. Control of wastes is rated as adequate.

DUNDEE CEMENT COMPANY is located in Dundee Township, Monroe County. Wastes are produced from the quarrying of rock and production of cement, and are discharged to Macon Creek, a tributary of Raisin River. Restrictions have been established on the alkalinity-acidity range, on the content of settleable solids in the discharges and on the quality of sanitary sewage effluents by a new use Order of Determination issued by the Water Resources Commission, September 23, 1958. Methods provided for control of process wastes coincident with start of operations have not been adequate to meet restrictions imposed. Corrective measures have recently been installed. Sanitary sewage is treated by secondary processes with effluent chlorination. Control of wastes is rated as adequate, pending appraisal of performance by Water Resources Commission staff survey.

E. I. DUPONT DE NEMOURS AND COMPANY

Industrial and Biochemicals Division is located in the City of Ecorse. Operations for manufacture of sulphuric acid produce cooling waters which flow to Detroit River. Cooling is by the indirect method and the waters used are normally unaffected by the process operations except for rise in temperature. Discharges are required to meet restrictions on acidity-alkalinity range and on sanitary sewage disposal by an increased use Order of Determination issued by the Water Resources Commission on May 22, 1957. Prevention of product leaks is maintained by control devices installed in the process. Sanitary sewage is settled and disposed of by subsurface percolation methods on the plant premises with no direct discharge to the river. Control of wastes is rated as adequate.

EVANS PRODUCTS COMPANY is located in Plymouth Township, Wayne County, and uses Rouge River for disposal of cooling waters and surface runoff from the premises. Cooling waters are unaffected by the process operations except for temperature increase. Sanitary sewage and process wastes are connected to municipal sewers. Control of wastes is rated as adequate.

FEDERAL SCREW PRODUCTS CORPORATION is located in the City of Chelsea. Wastes consist of oils and cooling waters resulting from the operation of screw machines. The oils are collected and disposed of by commercial waste oil contractors. Cooling waters are discharged to a city-owned storm drain connected to Letts Creek, a tributary of the Huron River. Sanitary waste is treated in the municipal plant. Control of wastes is rated as adequate.

FIRESTONE TIRE AND RUBBER COMPANY

The Firestone Steel Products Division is located in the City of Riverview and discharges wastes to the Trenton

Channel of Detroit River. Wastes are produced from the fabrication of metals into wheels and tire rims. The principal waste constituents produced from these operations are acid and alkaline liquors and oils. Measures for control of these constituents were initially undertaken following request of the Michigan Stream Control Commission in 1947. Treatment and control measures now in effect are gravity separation, waste equalization and settling for oil bearing wastes and miscellaneous process wastes and controlled release of acids with neutralization through diffusion with Detroit River water. Sanitary sewage segregated and connected to the Wayne County system. Control of wastes is rated as adequate.

FORD MOTOR COMPANY conducts operations at nine locations which discharge wastes to watercourses in the Clinton, Rouge, Huron and Raisin River Basins:

The Chassis Parts Machining Plant is located in Sterling Township, Macomb County. Wastes originate from gear machining operations and are discharged to a county drain tributary to Clinton River. A new use Order of Determination issued by the Water Resources Commission, August 25, 1955, establishes restrictions on acid, turbidity, suspended solids, iron, oil and oxygen content of the process wastes and on the quality of sewage effluents. Treatment and control methods, necessary for compliance with the

Order requirements, were provided coincident with the start of operations. Sanitary sewage is treated in a secondary type plant with chlorination of the effluent. Process waste control performance was impaired in 1960 and additional facilities were installed. Adequacy has not been fully demonstrated. Treatment of sewage rated as adequate.

The Engineering Proving Ground is located in Bruce Township, Macomb County. Wastes originate from operation of an automobile proving ground and are discharged to Fisher Creek, a tributary of Clinton River. A new use Order of Determination issued by the Water Resources Commission, January 26, 1956, established restrictions on the oil and solids content of the cooling water discharges and on the quality of sanitary sewage effluents. Treatment and control methods necessary for compliance with the Order requirements were provided coincident with the start of operations. Sanitary sewage is treated in a secondary type plant with chlorination of the effluent. Control of wastes is rated as adequate.

The Lincoln Division is located in the City of Wixom. Wastes originate from automobile assembly operations and are discharged to Norton Creek, a tributary of Huron River. A new use Order of Determination, issued by the Water Resources Commission, April 26, 1956, establishes restrictions on acids, solids, oils, toxic and oxygen consuming substances and on sewage disposal. Treatment and control methods necessary for compliance with the Order requirements were provided coincident with the start of operations. Sanitary sewage is treated in a secondary type plant with chlorination of the effluent. Control of wastes is rated as adequate.

The Monroe Plant is located in the City of Monroe. Wastes originate from electroplating operations and are discharged to the Raisin River. The principal waste constituents are cyanide, copper, nickel, chromium and zinc. Measures for control of these constituents were initially taken at the request of the Water Resources Commission; subsequently on April 26, 1956 restrictions on the waste discharges were formally established by an increased use Order of Determination issued by the Water Resources Commission. Treatment and control methods now in effect consist of diluting weak rinse waters and chemical treatment and sedimentation of concentrated baths prior to discharge to the river. Sanitary sewage is treated on plant premises in a primary type plant with effluent chlorination. Control of wastes is rated as adequate.

The Northville Plant is located in Northville. Use of Rouge River for waste disposal is limited to cooling waters from a valve manufacturing operation. Sanitary sewage is connected to the Wayne County system. Waste control is rated adequate.

The Rouge Plant is located in the City of Dearborn and discharges wastes to the Rouge River. Wastes originate from integrated automobile manufacturing and assembly operations which include blast furnaces, coke ovens, steel rolling, metal casting, machining and fabrication. The principal waste constituents produced from these operations are solids in suspension, lubricating oils and greases, acids, phenols and ammonia. Measures were taken initially to control these constituents at the request of the Michigan Stream Control Commission and later to comply with requests or Orders of the Water Resources Commission. Phenol, ammonia and cyanide wastes created by subsequent expansion of the coke ovens were placed under restrictions by an increased use Order of Determination issued by the Water Resources Commission, November 12, 1952. Treatment and control methods now in effect consist of settling and skimming for removal of solids and oils from rolling mill wastes, settling for removal of solids from blast furnace wastes and deep well disposal of coke oven wastes. Control of free and soluble oils in wastes from machining operations is accomplished by purification and reclamation for re-use, supplemented by chemical treatment of the portions discarded to the sewers. Skimming and reclamation methods are employed for removal of oils from a creek carrying the combined wastes from a large portion of the plant. Control of acid liquors is limited to that resulting from dilution with other process waste and cooling water discharges. Sanitary sewage is segregated and connected to the Dearborn municipal system. Control of sewage, cyanides and solids is rated as adequate. Adequacy of control of phenol and oil wastes has not been fully demonstrated. Acid wastes are rated as being uncontrolled and are under continuing surveillance by the Water Resources Commission to determine the need for control.

The Utica Plant is located in Shelby Township, Macomb County. Plant only recently acquired by company. No manufacturing operations being carried on at present. Change-over to dry processing operations currently under way. Secondary type sewage treatment plant with effluent chlorination available when needed.

The Wayne Plant is located in Nankin Township, Wayne County, and discharges wastes to the Rouge River. Wastes consist of oils and paint solids produced in assembly plant operations. Paint sludges are treated prior to discharge by a gravity type oil-water separator. Sanitary sewage is discharged to the Wayne County System. Waste control is rated as adequate.

The Ypsilanti Plant is located in the City of Ypsilanti and discharges wastes to the Huron River. Wastes consist of acids, oils and cooling waters produced in the manufacture of automotive parts and accessories. Treatment facilities were provided at the request of the Water Resources Commission and consist of neutralization and oil recovery. Sanitary sewage is discharged to the Ypsilanti municipal system. Waste control is rated as adequate.

FUEL OIL CORPORATION is located in the City of River Rouge. Wastes originate from the operation of facilities for the storage and transportation of petroleum products. Disposal of wastes is to a boat slip connected to the Detroit River. The principal constituent in the wastes produced are products arising from cleaning of petroleum cargo ships. Control measures were installed initially at the request of the Michigan Stream Control Commission. Methods employed consist of retention, separation and skimming, using holding basins and a gravity type oil-water separator. Sanitary sewage is disposed of by subsurface percolation methods on the company premises with no direct discharge to the river. Control of wastes is rated as adequate.

GENERAL MOTORS CORPORATION conducts operations at four locations which discharge wastes to watercourses in the Rouge and Huron River Basins.

The Detroit Diesel Engine Division located in the City of Detroit uses the Rouge River for disposal of surface runoff from the premises. The oil content of the runoff is controlled by a gravity type oil-water separator. Sanitary sewage and process wastes are connected to the Detroit system. Control of wastes is rated as adequate.

The Detroit Diesel Engine Division located in Romulus Township, Wayne County, uses the Rouge River for disposal of treated sewage effluents. Treatment is of the secondary type with chlorination of the effluents. Control of wastes is rated as adequate.

The Detroit Transmission Division is located adjacent to Willow Run Airport in Ypsilanti Township, Washtenaw County. Wastes originate from automobile transmission manufacturing and assembly operations. Willow Run, a tributary of Huron River, is used for disposal of oil bearing wastes. Control is provided by two gravity type oil-water separators, coupled with chemical treatment measures within the plant. Sanitary sewage is segregated and connected to the Ypsilanti Township system. Control of wastes is rated as adequate.

The Fisher Body Division is located adjacent to Willow Run Airport in Ypsilanti Township, Washtenaw County, Wastes originate from automobile body assembly operations and are discharged to Willow Run, a tributary of Huron River. A new use Order of Determination issued by the Water Resources Commission on February 26, 1959 establishes restrictions on acids, settleable solids, chromium, oils and greases, and oxygen consuming substances and on the disposal of sanitary sewage. Treatment and control methods necessary for compliance with the Order requirements were provided coincident with the start of operations. Sanitary sewage is segregated and connected to the Ypsilanti Township system. Control of wastes is rated as adequate.

GREAT LAKES STEEL CORPORATION operates three manufacturing plants discharging wastes to the Detroit River.

The Blast Furnace Division is located on Zug Island in the City of River Rouge. It comprises blast furnaces and a by-product coke oven. The principal waste constituents originating in the operations are iron, limestone and coke particles in suspension, phenols, cyanides, ammonia and sanitary sewage. Measures for control of these constituents were taken initially at the request of the Michigan Stream Control Commission; subsequently on November 28, 1951 restrictions on waste discharges were formally established by a new use Order of Determination issued by the Michigan Water Resources Commission. Treatment and control methods now in effect consist of settling for removal of solids and solvent extraction for removal of phenols with evaporation of the residual effluents. Sanitary sewage is segregated and is discharged to Detroit River after being settled and chlorinated in facilities provided on the plant premises. Waste control has been rated as adequate, but a decrease in the removal of solids from the blast furnace wastes has been observed recently. Request has been made of the management for corrective action.

The Ecorse Rolling Mills are located at Tecumseh Road in the City of Ecorse. Wastes originate from the rolling of steel into sheets, bars and structural shapes. The principal constituents in the waste are iron solids in suspension, lubricating oils and greases, sulphuric acid liquors and sanitary sewage. Measures were taken initially to control these constituents at the request of the Michigan Stream Control Commission. Wastes created by subsequent expansion of rolling mill capacity were placed under restrictions of a new use Order of Determination issued by the Water Resources Commission, November 28, 1951. Treatment and control methods now in effect consist of settling and skimming in scale pits and in oil-water separators for removal of solids and oils and controlled release of acid liquors using mill cooling waters for neutralization. Sanitary sewage is segregated, part being connected to the Wayne County system and the remainder being settled and chlorinated in facilities on plant premises before discharge to Detroit River. Control of sewage is rated as adequate. Acid waste discharges are under continuing surveillance by Water Resources Commission to determine need for control beyond that presently provided. Control of oil wastes has not been fully established.

The Hot Strip Mill is located in the City of River Rouge. Waste discharges are required to meet restrictions on acidity-alkalinity, oils, suspended solids, color, turbidity and sewage by new use Order of Determination issued by the Water Resources Commission on June 25, 1959. Treatment and control methods for settling and skimming of process wastes placed in effect coincident with start of mill operations in 1961. Sanitary sewage is segregated and connected to the Wayne County system. Waste control has been satisfactory during early operations.

HIGBIE MANUFACTURING COMPANY is located in the Village of Rochester and uses Paint Creek, a tributary to the Clinton River, for disposal of uncontaminated cooling waters. No industrial process wastes are produced. Sanitary sewage is connected to the Rochester municipal system. Control of waste is rated as adequate.

HOME CANNING COMPANY is located in the Village of Blissfield. Wastes resulting from the canning of tomatoes and squash are discharged seasonally into the Raisin River via the Pollard Drain. Measures taken to reduce solids and oxygen consuming characteristics of process wastes have been largely ineffective. Treatment and disposal system consists of screening, a lagoon and spray irrigation system utilized either singly or in combination. Sanitary sewage is connected to the Blissfield municipal system. Waste control is rated incomplete.

HOOVER BALL AND BEARING operates two manufacturing plants which discharge waste to watercourses in the Raisin River Basin:

The Ann Arbor Plant is located in Pittsfield Township, Washtenaw County. Wastes are produced from the assembly of bearings and are discharged to a county drain tributary to the Raisin River. Restrictions on the waste discharges were established by a new use Order of Determination issued by the Water Resources Commission on February 28, 1957. A secondary type sewage treatment plant with chlorination was placed in operation coincident with the start of manufacturing operations. Soluble oils are hauled to a disposal site for ponding and disposal by percolation. Control of wastes is rated as adequate.

Universal Die Casting Division is located in Saline. Wastes originate from electroplating operations and are discharged to the Saline River, a tributary to the Raisin River. In 1952 the Water Resources Commission invoked the statutory procedure to abate pollution created by the wastes. A Final Order of Determination issued on February 25, 1953 restricted the cyanide, copper, chromium content and the acidity-alkalinity range of discharges. Wastes created by subsequent expansion of plating operations were placed under restriction by an increased use Order of Determination issued by the Water Resources Commission on March 25, 1959. Treatment and control methods now in effect consist of the destruction of cyanide by chlorination and the precipitation and settling of the metal components. Sanitary sewage is segregated and connected to the Saline municipal system. Control of wastes is rated as adequate.

HURD LOCK AND MANUFACTURING COMPANY is located in the City of Adrian. Wastes originate from electroplating operations and are discharged to the South Branch of Raisin River. In 1953 the Water Resources Commission invoked the statutory procedure against the company to abate pollution created by the wastes. A Final Order of Determination issued on January 27, 1954 restricts the chromium, copper and cyanide content and the acidity-alkalinity range of discharges. Waste treatment and control measures necessary to meet these restrictions are now available employing chemical oxidation of cyanide, chemical reduction and precipitation of chromium and neutralization by intermixing acid and alkaline wastes. Sanitary sewage is connected to the Adrian municipal system. Adequacy of performance in maintaining constituents at levels specified has not been fully demonstrated.

KING-SEELEY Corporation conducts electroplating operations at a plant in Scio Township, Washtenaw County. Wastes originating from the process are discharged to Huron River. Discharges are required to meet restrictions on acidity-alkalinity range, metallic ions and cyanides by an increased use Order of Determination issued by the Water Resources Commission on September 29, 1955. Treatment and control methods necessary to meet the Order requirements were in effect coincident with the increase in waste discharges. Facilities necessary to comply with the Order requirements on sanitary sewage disposal have been provided employing secondary type treatment with effluent disinfection. Control of wastes is rated as adequate.

KOPPERS COMPANY, INC.

The Tar Products Division is located in the City of Wyandotte. Use of Detroit River for waste disposal is limited to cooling waters which are unchanged by the process except for a rise in temperature. Process wastes and sanitary sewage are connected to the Wyandotte municipal system. Control of wastes is rated as adequate.

LONGWORTH PLATING COMPANY is located in the City of Chelsea. Wastes originate from electroplating operations and are discharged to a city-owned storm sewer tributary to Letts Creek and the Huron River. Principal waste constituents consist of cyanide and metallic ions. Control was provided at the request of the Water Resources Commission and employs chemical oxidation and sedimentation methods. Sanitary sewage is discharged to the Chelsea municipal system. Control facilities have been found unreliable.

MCLOUTH STEEL CORPORATION operates two manufacturing plants discharging wastes to Detroit River:

The Gibraltar Plant is located in the Village of Gibraltar. Wastes are produced from the steel rolling and annealing operations and flow to Detroit River via the Frank and Poet County Drain. The principal waste constituents originating from the operations are solids in suspension, oils and sanitary sewage. Restrictions on these constituents have been established by a new use Order of Determination issued April 27, 1955 and a supplemental Order of Determination issued February 21, 1956 by the Water Resources Commission. Treatment and control methods required for compliance with these Orders are in effect. They consist of settling for removal of solids and gravity separation of oils with the aid of chemicals. Sanitary sewage is segregated and connected to the Wayne County system. Control of wastes is rated as adequate.

The Trenton Plant is located in the City of Trenton. Wastes are produced from the operation of blast furnaces and rolling mills. The principal waste constituents originating from the operations are iron, coke and limestone solids in suspension, lubricating oils and greases, sulphuric acid liquors and sanitary sewage. Restrictions on these constituents have been established by an increased use Order of Determination issued on February 28, 1958 and a supplemental Order of Determination issued August 26, 1960 by the Water Resources Commission. Treatment facilities for process wastes have been enlarged, revised and improved on several occasions to seek compliance. Major improvements were last completed in 1961. Control methods now employed consist of settling for removal of suspended substances and skimming for removal of floating oils. Acid liquor in conjunction with lime are used as a coagulant to aid in removal of solids with neutralization and iron recovery being accomplished in the process. Operation of the treatment system produces control ranging from excellentto inadequate. Changes and improvements in operating controls and techniques are continuing to be made to improve the quality of the effluents. Sanitary sewage is segregated and connected to the Wayne County system.

MERGRAF OIL PRODUCTS, INC. is located in the City of Northville. Wastes originating from the processing of waste industrial oils intc useable products are discharged to Rouge River. The principal waste constituent produced from this operation is free oil. Control methods employed are equalization, emulsion breaking and separating by gravity. Effluents are occasionally aerated to control odors.

Adequacy of control has not been fully demonstrated.

MICHIGAN SEAMLESS TUBE COMPANY is located in the City of South Lyon. Wastes resulting from the manufacture of steel tubing consists mainly of uncontaminated cooling waters which are discharged directly into the Yerkes Drain, a tributary of Huron River. Small volumes of acid liquors are disposed of in a lagoon on company property. Sanitary sewage is connected to the South Lyon municipal system. Control of wastes is rated as adequate.

MILLS PRODUCTS, INC. is located in Canton Township, Wayne County. Wastes originate from electroplating operations and are discharged to the lower Rouge River. Company is operating under effluent restrictions stipulated to between the predecessor company and Water Resources Commission. Treatment and control methods are provided to restrict the content of copper, nickel and chromium. Control of wastes is rated as adequate.

MOBIL OIL COMPANY is located in the Village of Woodhaven, Wayne County. Wastes originate from the operation of an oil refinery and discharge to the Trenton Channel of Detroit River. Waste control measures were undertaken initially at the request of the Michigan Stream Control Commission and improved later to comply with the requests of the Water Resources Commission. Treatment and control methods now in effect consist of retention, separation and skimming of the surface water runoff from the premises for removal of oils, separation and skimming of process wastes by gravity and pressure flotation type oil-water separators in series, and aeration for reduction of phenol bearing waste flows. Chloride bearing waste discharges created by the formation of an underground cavity for storage of petroleum products are restricted by a new use Order of Determination issued by the Water Resources Commission, November 30, 1960. Sanitary sewage is disposed of by subsurface percolation methods on company premises with no direct discharge to the river. Control of oil wastes is rated as adequate. Adequacy of control of phenolic substances has not been fully demonstrated.

MONROE AUTO EQUIPMENT COMPANY is located in the City of Monroe. The principal waste constituents produced are chromium salts, soluble and free oils and cooling waters. Chromium wastes are discharged to the municipal sewer system. Soluble oils are hauled away to a disposal site. Free oil losses are controlled by recovery methods within the plant, although traces of oil are present on the cooling water discharges to Raisin River. Sanitary sewage is segregated and connected to the Monroe municipal system. Adequate control of oil losses has not been fully demonstrated.

MONROE PAPER PRODUCTS COMPANY is located in the City of Monroe. Wastes originate from the manufacture of paperboard and are discharged to the Raisin River. Wastes contain paper solids in suspension and oxygen demanding substances. Facilities for removing the paper solids from the wastes were provided in 1939. Treatment methods consist of chemical coagulation and sedimentation. Varying quantities of the treated effluent are re-used in the manufacturing process. Sanitary sewage is segregated and connected to the Monroe municipal system. Control of the suspended solids is rated as adequate. Adequacy of control of oxygen consuming substances has not been fully demonstrated.

MONSANTO CHEMICAL COMPANY is located in the City of Trenton. Wastes originate from the production of sodium phosphate and flow to the Trenton Channel of Detroit River. Settling by means of an earthen dyked basin is employed for removal of raw material and finished product solids from the discharges. Sanitary sewage has been disposed of to the Wayne County system since prior to 1950. Control of wastes is rated as adequate.

NATIONAL MACHINE PRODUCTS COMPANY is located in the City of Utica. Wastes originate from metal machining operations and are discharged to Clinton River. Discharges are required to meet restrictions established by a new use Order of Determination issued by the Water Resources Commission on October 25, 1956 limiting the acidity-alkalinity range, oil and solids content of the process wastes and imposing conditions on sanitary sewage disposal. Treatment and control measures necessary to meet the requirements of the Order are in effect. Sanitary sewage is to the Utica municipal system. Control of wastes is rated as adequate.

NATIONAL TWIST DRILL COMPANY is located in Avon Township, Oakland County. Wastes produced from the manufacture of twist drills, reamers, milling cutters and special carbide tools are discharged into an unnamed watercourse tributary to Stony Creek. Measures were taken at the request of the Water Resources Commission in 1950 to reduce oil content of waste discharges and to eliminate dumping of spent cyanide heat-treating salts. Treatment system consists of a tile underdrained lagoon equipped with an oil skimming device. Soluble oils are "broken" with caustic. Heat-treat wastes are hauled by a commercial contractor for treatment. Waste control is considered adequate.

PARKE-DAVIS AND COMPANY is located in the City of Detroit. Wastes originate from the manufacture of pharmaceutical products. The principal waste constituents are suspended solids, acids, caustics and dyes. At the request of the Michigan Stream Control Commission all process waste and sanitary sewage discharges were connected to the Detroit municipal system in 1947. Present discharges to the Detroit River consist of cooling waters which are unaffected by the process except for a rise in termperature. Control of wastes is rated as adequate.

PENINSULAR PAPER COMPANY is located in the City of Ypsilanti. Wastes are produced from the manufacture of paper, using purchased pulp as raw material and are discharged to Huron River. Principal waste constituents originating in the operations are suspended paper fiber and dyes. Fiber losses are controlled by recirculation and recovery methods applied to the paper machine white waters with no formalized treatment being employed. Adequacy of waste control has not been fully demonstrated.

PENNSALT CHEMICALS CORPORATION operates two separate manufacturing plants discharging wastes to the Detroit River:

The East Side Plant is located in Wyandotte. The principal waste constituents produced are inert calcium and magnesium salts in suspension and ammonia and sodium salts in solution. Measures for control of these constituents are limited to production practices applied within the plant. Following request of the Michigan Stream Control Commission in 1947 all sanitary sewage discharges and certain industrial process wastes were routed to the Wyandotte municipal system for treatment. Control is considered adequate.

The West Side Plant is located in Riverview and discharges wastes to Monguagon Creek, a tributary to the Trenton Channel of the Detroit River. Wastes originate from the manufacture of a variety of organic chemical products. The principal constituents in the wastes produced are phenol, oil, caustic and solids. Measures to control these constituents were taken initially at the request of the Michigan Stream Control Commission and later improvements were made at the request of the Water Resources Commission. Treatment and control methods now in effect are gravity separation, settling and skimming for removal of oils and solids; equalization for neutralization of caustics; and restriction of phenol losses through process controls. Sanitary sewage is segregated and connected to the Wayne County system. Adequacy of process waste controls has not been fully demonstrated.

PETROLEUM SPECIALTIES CORPORATION is located in Brownstown Township, Wayne County. Wastes containing oils and greases are producedfrom petroleum refining operations. An earthen lagoon with a skimming device is provided to remove oils and grease prior to discharge to Silver Creek, a tributary of the Huron River. Adequacy of control has not been fully demonstrated.

POWER REACTOR DEVELOPMENT COMPANY is located in Frenchtown Township, Monroe County. Wastes will be produced upon start of operation of a fast breeder nuclear reactor sometime in late 1962 at the Enrico Fermi Atomic Power Plant. Discharges will flow to Lake Erie via Swan Creek.

Restrictions and conditions have been established on chromium, oil, solids and radionuclide content of the discharges and on sanitary sewage by a new use Order of Determination issued June 22, 1961 by the Water Resources Commission. Treatment and control facilities necessary to meet these restrictions have been completed and are in readiness to operate. Sanitary sewage is collected in a separate system which is connected to secondary type facilities with effluent chlorination operated by Detroit Edison Company's adjoining steam electric generating plant.

REVERE COPPER AND BRASS, INC. is located in the City of Detroit. Wastes are produced from copper and brass rolling operations and are discharged to Detroit River. At the request of the Michigan Stream Control Commission in 1946, measures were instituted to neutralize acids, to restrict oils and to eliminate raw sewage discharges. Control of oil wastes is accomplished by a series of gravity type oil-water separators installed within the plant. Segregation of sanitary sewage and connection to the Detroit system was provided in 1948. Control of wastes is rated as adequate.

REYNOLDS CHEMICAL PRODUCTS COMPANY is located in Northfield Township, Washtenaw County. Wastes are produced from manufacture of plastic products and flow to Horseshoe Lake Outlet Drain, a tributary of Huron River.

A new use Order of Determination issued by the Water Resources Commission July 24, 1958 restricts the discharges to cooling waters which have not come into contact with substances used in the process, establishes a limit on the temperature of these waters and places requirements on disposal of sanitary sewage. Control of sewage discharges is accomplished by subsurface percolation methods on company premises with no direct discharge to the drain. Control of wastes is rated as adequate.

ROBIN PRODUCTS COMPANY is located in the City of Warren. Wastes are produced from mechanical plating operations and are discharged to the Fogg Drain, a tributary to the Clinton River. Discharges are required to meet restrictions on acidity-alkalinity range, chromium, copper, zinc, oil and solids by a new use Order of Determination issued by the Water Resources Commission on June 22, 1961. Treatment and control methods necessary to meet the Order requirements were provided coincident with start of plating operations. Sanitary sewage is disposed of by subsurface percolation on company premises with no direct discharge to the drain. Control of wastes is rated as adequate.

ROCHESTER PAPER COMPANY is located in the Village of Rochester. Wastes produced from the manufacture of absorbant type papers are discharged into the Clinton River. Measures were taken prior to 1950 to reduce fiber losses through an "in plant" program of water conservation and re-use. Sanitary sewage is connected to the Rochester municipal system. Control of wastes is rated as adequate.

ROCKWELL-STANDARD CORPORATION

Chelsea Spring Division is located in Chelsea and discharges uncontaminated cooling water to Letts Creek, tributary to Huron River. No other industrial wastes are produced. Sanitary sewage is discharged to the Chelsea municipal system. Waste control is rated as adequate.

SCOTT PAPER COMPANY is located in the City of Detroit. Wastes originate from integrated sulphite pulp and paper manufacturing operations and are discharged to the Old Channel of Rouge River. Principal waste constituents are pulp and paper solids in suspension, acid sulphite liquors in solution and oxygen consuming substances. Control methods employed are limited to reduction of paper fiber losses to the extent they can be recovered and reused. The Water Resources Commission examined the waste problems at a conference with the Company in April, 1956. Action was tabled pending further developments that would support the need for more extensive control.

SHAWINIGAN RESINS CORPORATION is located in the City of Trenton. Wastes are produced from the manufacture of vinyl acetate type resins and are discharged to Detroit River. The principal constituents are sulphuric and acetic acid and traces of organic solvents. Restrictions on these substances have been established by a new use Order of Determination issued January 26, 1956 by the Water Resources Commission. Control facilities necessary to comply with the Order requirements were installed coincident with start of operations and consist of distillation units for recovery of solvents and neutralization of acids. Sanitary sewage is connected to the Wayne County system. Control of wastes is rated as adequate.

SIMPLEX PAPER COMPANY is located in Palmyra Township, Lenawee County. Wastes are produced from the production of building paper and are discharged to the Raisin River. The principal waste constituents are paper solids, clay and coloring materials in suspension and oxygen demanding substances. In 1949 the Water Resources Commission invoked the statutory procedure to abate pollution created by these wastes. A Final Order of Determination issued on November 22, 1949 restricts the suspended solids content of the discharges. Treatment and control methods necessary to meet these restrictions are now in effect employing chemical treatment and an air flotation type of recovery system. Control of wastes is rated as adequate.

SPARTAN PRODUCTS, INC. is located in the City of Madison Heights. No industrial wastes are produced from company's operations which consist of casting plastic foam.

A new use Order of Determination adopted by the Water Resources Commission in December, 1959 establishes restrictions on sanitary sewage discharged to Red Run Drain, a tributary of Clinton River. To meet the ordered restriction, secondary treatment and chlorination of the sewage were provided coincident with the start of manufacturing operations. Control of wastes is rated as adequate.

TECUMSEH PRODUCTS COMPANY is located in the City of Tecumseh and is engaged in manufacturing refrigeration compressors and condensing units. Industrial wastes consist solely of cooling waters which are discharged into the North Branch of the Raisin River. Sanitary sewage is connected to the Tecumseh municipal system. Control of wastes is rated as adequate.

TERNES STEEL COMPANY is located in the City of Roseville. Wastes are produced from cleaning and painting of steel parts. The principal waste constituents are phosphoric acid cleaners and paint solids. Discharges are required to meet restrictions on acidity-alkalinity range, oil solids, toxic material and oxygen consuming substances by a new use Order of Determination issued by the Water Resources Commission on August 27, 1959. Process wastes and sanitary sewage are discharged to a township sanitary sewer system for treatment. Uncontaminated cooling waters are discharged to Sweeney Drain, a tributary to the Clinton River. Waste control is rated as adequate.

THOMPSON RAMO WOOLDRIDGE, INC.

Thompson Products Michigan Division is located in Sterling Township, Macomb County. Wastes are produced by machining and fabricating operations and are discharged to Beaver Creek, a tributary to the Clinton River. A new use Order of Determination issued by the Water Resources Commission on December 7, 1955 establishes restrictions on acidity-alkalinity, oil and grease, toxic chemicals and sanitary sewage. A secondary type plant for treatment of sewage was provided coincident with the start of manufacturing. Operation of treatment plant proved unsatisfactory because of oil losses to system. Water Resources Commission requested installation of oil recovery equipment which was provided in 1957. Additional industrial treatment facilities were provided in late 1961 to comply with the Order of Determination. Adequacy of waste controls not fully demonstrated.

TRILEX CORPORATION is located inCanton Township, Wayne County. Wastes originate from electroplating of automotive hardware and are discharged to a county drain tributary to Rouge River. Principal waste constituents produced from the operations are metallic ions and cyanides. Treatment and control methods were initiated in 1956 at the request of the Michigan Water Resources Commission. Treatment and control measures consist of chemical oxidation of cyanides and chemical precipitation and settling of metallic ions. Sanitary sewage has been disposed of by subsurface percolation on company premises with no direct outlet to river. Control of wastes is rated as adequate.

UNION BAG-CAMP PAPER CORPORATION

River Raisin Paper Company Division is located in the City of Monroe. Wastes originate from the manufacture of boxboard and are discharged to the Raisin River. The principal waste constituents are paper solids in suspension and oxygen consuming substances. Measures for removing the paper solids from the wastes were taken initially following request by Michigan Stream Control Commission in 1948 and later additions were made at the request of the Water Resources Commission. Treatment and control methods now in effect are chemical coagulation followed by gravity settling for solids removal. Varying quantities of treated effluent are re-used in the manufacturing operations. Sanitary sewage is segregated and connected to the Monroe municipal system. Control of the suspended solids is rated as adequate. Oxygen consuming substances exceed assimilative capacity of the river and seasonal oxygen depletion occurs in the lower river.

U. S. GYPSUM COMPANY is located in the City of River Rouge. Wastes are produced from the manufacture of gypsum board and flow to Rouge River. Operations produce no process wastes. Sanitary sewage is segregated and connected to the municipal system. Control of wastes is rated as adequate.

U. S. RUBBER COMPANY is located in the City of Detroit. Wastes are produced from rubber tire manufacturing operations and are discharged to Detroit River. The principal waste constituents originating from these operations are inert solids in suspension and lubricating oils and greases. Measures for control of these constituents and for elimination of raw sewage discharges were initiated following a request by the Michigan Stream Control Commission in 1946. Control of solids and oils has been accomplished through reduction of wastes at the source. Sanitary sewage segregated and connected to the Detroit system since 1947. Control of wastes is rated as adequate.

WOLVERINE FABRICATING & MANUFACTURING COMPANY is located in the Village of Dundee. Wastes resulting from the manufacture of paper are discharged into the Raisin River. A new use Order adopted by the Water Resources Commission in September, 1954 establishes restrictions on pH, suspended solids, chemical compounds and sanitary sewage. Facilities necessary for compliance provided coincident with the start of manufacturing operations. Control of wastes was rated as adequate in 1961. Manufacturing operations have recently been suspended.

WYANDOTTE CHEMICALS CORPORATION operates two plants in Wyandotte which discharge wastes to the Detroit River.

North Plant produces wastes from the operation of a by-product coke oven plant and the manufacture of soda ash and allied inorganic chemicals and synthetic detergents. The principal wastes constituents are inert calcium carbonate solids in suspension, phenol, ammonia and chlorides in solution and oils. Oil and ammonia are controlled by recovery methods employing gravity type oil-water separators in the plant. Solids and phenol are discharged to waste beds on Fighting Island. Effluents from the bed discharge to the Detroit River. At the request of the Michigan Stream Control Commission the sanitary sewage was segregated and connected to the Wayne County system in 1949. Control of wastes is rated as adequate.

South Plant produces wastes from the manufacture of soda ash and allied inorganic chemicals and glycol. The principal waste constituents are inert calcium carbonate solids in suspension, ammonia and chlorides in solution and oils. Following request of Michigan Stream Control Commission measures were taken in 1949 to reduce oil losses and to eliminate sanitary sewage discharges. Solids discharges are treated in waste beds on Fighting Island. Effluents from the beds discharge to the Detroit River. Control of oil and ammonia losses is maintained by operating procedures within the plant. Sanitary sewage is segregated and connected to the Wayne County system. Control of wastes is rated as adequate.

## CHAPTER IV. ACCOMPLISHMENTS AND WORK TO BE DONE.

The success of the Commission and Health Department staff effort combined with that of the Commission member agencies in curbing pollution over the years prior to 1955 was attested to by Mark Hollis, Assistant Surgeon General of the Public Health Service. This was on the occasion of a meeting of the Federal Water Pollution Control Advisory Board in Midland, August 25-26, 1955. More recently, Governor John B. Swainson said in his letter of December 5, 1961 to H. E. and W. Secretary Ribicoff "The Michigan Water Resources Commission, our water pollution control agency, has compiled an exemplary record of pollution abatement throughout the state."

The success which accompanied the administrative efforts and such delays as have been encountered is the product of many factors. Only a few can be mentioned here. Coordination and correlation of effort between Commission and member agency heads and their respective staffs have been of first importance where statutes such as those in Michigan exist. Hours of fact finding, counseling, persuasion and attempts at education through public meetings and other means have brought results in many instances. The exercise of procedures authorized by statute has been next in order. The Health Commissioner may and does withhold construction permits for new public sewer systems or extensions to existing systems where adequate provision has not been made for treatment. Conferences to show cause why pollution should not be abated may and are held before the Commission. New or increased pollution has been prevented by Orders of Determination and existing pollution has been abated by Final Orders of Determination, both issued by the Commission pursuant to its statutory autherity. Orders and Agreements of the State Health Commissioner have been equally effective in accomplishing these ends. When compliance is not forthcoming by the administrative tools at hand, the Commission and Health Department seek enforcement in the Courts through referral of the defaulted Order, or Agreement, to the Attorney General.

The principal factor in delay is the financing problem which always exists to some extent in municipalities but is a severe problem in many urbanized, unincorporated areas.

Many municipalities have defaulted in recent years, apparently to invite the settling of a Court Order upon them. This relieves local officials of responsibility and makes subsequent financing of the necessary facilities automatic under the provisions of Act 320, P.A. 1927. Port Huron was the lead or key case in 1941. See:

Stream Control Commission vs. Port Huron----305 Mich. 153..
Stream Control Commission vs. Port Huron----323 Mich. 541.
Mayor of Port Huron vs. City Treasurer------328 Mich. 99.

Other local enabling Acts in addition to Home Rule authorizations assisting municipalities to finance needed facilities on a separate or group basis are the following:

1. Revenue Bond Law----------Act 94, P.A. 1933, as amended.
2. County Water & Sewer Law--Act 342, P. A. 1939, as amended.
3. County Public Works-------Act 185, P. A. 1957, as amended.

Within the past six years the presence or prospect of Federal construction grant assistance has offset some municipal reluctance to act constructively.

Industrial managements, as a group, have been far more responsive than municipalities to Commission requests and Orders for pollution control measures.

Industries have been equally active over the past 15 year period in bringing their discharges under approved control. With very few exceptions, sanitary sewage is now collected and treated in municipal systems or by approved methods at industry owned and operated facilities. Facilities and methods for treatment or control of the polluting constituents in the process wastes are provided at virtually all industries. The degree of control or treatment varies from that resulting from reducing raw material and product losses to the sewer through recovery and re-use methods to primary and secondary treatment by chemical and biological methods employing conventional sewage treatment principles. At those industries where waste control is rated adequate by the Commission staff, treatment or control is provided to a degree necessary to prevent conditions of unlawful pollution as defined in the Water Resources Commission Act.

## Enforcement Actions

The high percentage of total communities and industries where formal corrective actions have been taken by the Water Resources Commission and Health Commissioner is indicative of the agressive program of these agencies to control pollution throughout the area. The nature of these actions, when taken, and the status of compliance therewith is shown in Tables XV, XVI, XVII and XVIII.

Two terms used in these Tables require clarification. "Stipulation" as used here refers to a formal action taken by the governing body of a municipality or industrial management expressing intent to comply with pollution control requirements of the Water Resources Commission. It usually incorporates a time schedule for abatement and the degree of control to be provided. The adoption of the Stipulation and its acceptance by the Water Resources Commission is in lieu of the issuance of an Order by the Commission containing essentially the same requirements as set forth in the Stipulation. The term "Agreement" refers to an enforceable Agreement entered into between the State Health Commissioner and the governing body of a municipality by which the municipality binds itself to construct specified sewerage works including treatment pursuant to a required time schedule. This Agreement, and the assurances it provides for control of pollution, qualifies the municipality for permits from the Health Commissioner for certain requested sewer construction.

The effectiveness of these procedures may be evaluated in terms of the extent of compliance by construction of the required facilities. As shown in Table XV, all except three of the communities either have complied with the requirements or have scheduled the construction to commence in 1962. It is expected that all of these projects will be completed by late 1963 and many of them sooner. The industries where further needs are to be met are shown in Table XVII.

(Tables XV, XVI, XVII and XVIII are as follows:)

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## TABLE XV

# FORMAL CORRECTIVE ACTIONS AGAINST MUNICIPALITIES

by

# MICHIGAN DEPARTMENT OF HEALTH AND WATER RESOURCES COMMISSION

# TO MAINTAIN CONTROL OF POLLUTION

| | Order, Stipulation or Agreement | | | | | |
|---|---|---|---|---|---|---|
| Community | Action | Issuing Agency | Year | Facilities Required | Year Action Affirmed by Court Decree | Status of Compliance March 27, 1962 |
| Adrian | Order | W.R.C. | 1936 | Additions | 1949 | Complied |
| Allen Park | Agreement | M.D.H. | 1958 | Additions | ---- | Scheduled 1962 |
| Belleville | Order | W.R.C. | 1956 | Additions | 1957 | Scheduled 1962 |
| Berkley | Order | M.D.H. | 1957 | Additions | ---- | Scheduled 1962 |
| Beverly Hills | Order | M.D.H. | 1957 | Additions | ---- | Scheduled 1962 |
| Birmingham | Order | W.R.C. | 1952 | New | 1955 | Complied |
| Birmingham | Order | M.D.H. | 1957 | Additions | ---- | Scheduled 1962 |
| Blissfield | Order | W.R.C. | 1951 | New | ---- | Complied |
| Bloomfield Hills | Order | W.R.C. | 1952 | New | 1955 | Complied |
| Bloomfield Twp. | Order | W.R.C. | 1952 | New | 1955 | Complied |
| Center Line | Order | W.R.C. | 1958 | New | 1960 | Commenced |
| Chelsea | Agreement | M.D.H. | 1959 | Additions | ---- | Complied |
| Clawson | Order | M.D.H. | 1957 | Additions | ---- | Scheduled 1962 |
| Dearborn | Stip'n. | W.R.C. | 1956 | New | ---- | Scheduled 1962 |
| Dearborn Twp. | Order | M.D.H. | 1961 | Additions | ---- | Commenced 1961 |
| Detroit | Order | W.R.C. | 1950 | New | ---- | Complied |
| Detroit | Order | W.R.C. | 1950 | New | ---- | Under construction |
| Detroit | Agreement | M.D.H. | 1959 | Additions | ---- | Commenced 1961 |
| Dundee | Order | W.R.C. | 1951 | New | 1956 | Complied |
| Ecorse | Agreement | M.D.H. | 1958 | Additions | ---- | Scheduled 1962 |

## ENFORCEMENT ACTIONS AGAINST MUNICIPALITIES (continued)

| Community | Order, Stipulation or Agreement |  |  | Facilities Required | Year Action Affirmed by Court Decree | Status of Compliance March 27, 1962 |
|---|---|---|---|---|---|---|
|  | Action | Issuing Agency | Year |  |  |  |
| Farmington | Order | W.R.C. | 1950 | New | 1953 | Complied |
| Ferndale | Order | W.R.C. | 1951 | Additions* | ---- | Complied |
| Ferndale | Order | M.D.H. | 1957 | Additions | ---- | Scheduled 1962 |
| Flat Rock | Agreement | M.D.H. | 1958 | Additions | ---- | Scheduled 1962 |
| Garden City | Order | M.D.H. | 1961 | Additions | ---- | Commenced 1961 |
| Gibraltar | Agreement | M.D.H. | 1958 | Additions | ---- | Scheduled 1962 |
| Grosse Ile Twp. | Petition | W.R.C. | 1957 | New | ---- | Scheduled |
| Grosse Pte. Park | Stip'n. | W.R.C. | 1960 | Additions | ---- | Under construction |
| Grosse Pte. Woods | Agreement | M.D.H. | 1958 | Additions | ---- | Commenced 1961 |
| Harper Woods | Agreement | M.D.H. | 1958 | Additions | ---- | Commenced 1961 |
| Hazel Park | Order | W.R.C. | 1958 | Additions | 1962 | Scheduled |
| Hazel Park | Order | M.D.H. | 1957 | Additions | ---- | Scheduled 1962 |
| Huntington Woods | Order | M.D.H. | 1957 | Additions | ---- | Scheduled 1962 |
| Lathrup Village | Order | W.R.C. | 1954 | New | 1956 | Scheduled 1962 |
| Lincoln Park | Agreement | M.D.H. | 1958 | Additions | ---- | Scheduled 1962 |
| Livonia | Order | W.R.C. | 1950 | New | ---- | Complied |
| Livonia | Order | M.D.H. | 1961 | Additions | ---- | Commenced 1961 |
| Madison Heights | Order | M.D.H. | 1957 | Additions | ---- | Scheduled 1962 |
| Manchester | Order | W.R.C. | 1951 | New | 1952 | Complied |
| Melvindale | Order | W.R.C. | 1951 | New | ---- | Complied |
| Milan | Order | W.R.C. | 1951 | New | ---- | Complied |
| Milford | Order | W.R.C. | 1951 | Additions | ---- | Complied |
| Nankin Township | Order | M.D.H. | 1961 | Additions | ---- | Commenced 1961 |
| Northville | Order | M.D.H. | 1961 | Additions | ---- | Commenced 1961 |
| Oak Park | Order | M.D.H. | 1957 | Additions | ---- | Scheduled 1962 |
| Pleasant Ridge | Order | M.D.H. | 1957 | Additions | ---- | Scheduled 1962 |
| Plymouth | Order | M.D.H. | 1961 | Additions | ---- | Commenced 1961 |
| Plymouth Twp. | Order | M.D.H. | 1961 | Additions | ---- | Commenced 1961 |
| Pontiac | Order | W.R.C. | 1951 | Additions | ---- | Complied |
| Pontiac | Order | W.R.C. | 1959 | New | 1960 | Commenced |

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## ENFORCEMENT ACTIONS AGAINST MUNICIPALITIES (continued)

| Community | Order, Stipulation or Agreement: Action | Issuing Agency | Year | Facilities Required | Year Action Affirmed by Court Decree | Status of Compliance March 27, 1962 |
|---|---|---|---|---|---|---|
| Redford Township | Order | M.D.H. | 1961 | Additions | ---- | Commenced 1961 |
| River Rouge | Agreement | M.D.H. | 1958 | Additions | ---- | Scheduled 1962 |
| Riverview | Agreement | M.D.H. | 1960 | Additions | 1961 | Scheduled 1962 |
| Rochester | Agreement | M.D.H. | 1960 | Additions | ---- | Complied |
| Rockwood | Agreement | M.D.H. | 1958 | Additions | ---- | Scheduled 1962 |
| Romeo | Agreement | M.D.H. | 1959 | Additions | 1962 | Scheduled 1962 |
| Romulus Township | Agreement | M.D.H. | 1958 | Additions | ---- | Scheduled 1962 |
| Royal Oak | Order | M.D.H. | 1957 | Additions | ---- | Scheduled 1962 |
| Royal Oak Twp. | Order | M.D.H. | 1957 | Additions | ---- | Scheduled 1962 |
| Saline | Order | W.R.C. | 1951 | New | ---- | Complied |
| South Lyon | Agreement | M.D.H. | 1958 | Additions | ---- | Complied |
| S.Macomb San. Dist. | Stip'n. | W.R.C. | 1960 | Additions | ---- | Financing Stage |
| S.E. Oakland Co. Sew. Dis. System | Order | W.R.C. | 1951 | Additions* | ---- | Complied |
| Southfield | Order | W.R.C. | 1952 | New | 1956 | Complied |
| Taylor Township | Agreement | M.D.H. | 1958 | Additions | ---- | Scheduled 1962 |
| Tecumseh | Order | W.R.C. | 1949 | New | ---- | Complied |
| Trenton | Agreement | M.D.H. | 1958 | Additions | ---- | Scheduled 1962 |
| Troy | Order | M.D.H. | 1957 | Additions | ---- | Scheduled 1962 |
| Washtenaw County | Petition | W.R.C. | 1957 | New | ---- | Inactive |
| Wayne | Order | M.D.H. | 1961 | Additions | ---- | Commenced 1961 |
| Wyandotte | Agreement | M.D.H. | 1958 | Additions | ---- | Scheduled 1962 |
| Ypsilanti | Agreement | M.D.H. | 1961 | Additions | ---- | Commenced 1962 |

* Applies to content of phenols discharged to Red Run

## TABLE XVI

### RECAPITULATION

### ORDERS, STIPULATIONS OR AGREEMENTS TO CONTROL MUNICIPAL SEWAGE POLLUTION

issued by

### MICHIGAN DEPARTMENT OF HEALTH AND WATER RESOURCES COMMISSION

| River Basin | Orders, Stipulations or Agreements | | Court Decrees Affirming State Actions | | Status of Compliance by No. of Communities | | |
|---|---|---|---|---|---|---|---|
| | Total | No. Communities | Total | No. Communities | Complied | Under Construction | Construction Scheduled - 1962 |
| Lake St. Clair-Detroit River | 17 | 15 | 1 | 1 | 1 | 5 | 9 |
| Clinton | 20 | 17 | 5 | 5 | 5 | 2 | 12 |
| Huron | 9 | 9 | 1 | 1 | 3 | 1 | 4 |
| Raisin | 7 | 7 | 3 | 3 | 7 | 0 | 0 |
| Rouge | 19 | 18 | 5 | 5 | 6 | 9 | 4 |
| Lake Erie | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

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Table XVII

## ORDERS AND STIPULATIONS

Entered By

## WATER RESOURCES COMMISSION

for

## INDUSTRIAL WASTE CONTROL

| Company | Action | Year Entered | Facilities Required | Year Action Affirmed by Court Decree | Status of Compliance March 27, 1962 |
|---|---|---|---|---|---|
| Anderson Chemical Company | Order | 1960 | New | | Additions required |
| Argus Camera | Order | 1955 | New | | Complied |
| Belleville Plating Company | Order | 1958 | New | | Complied |
| Briggs Mfg. Company | Order | 1956 | New | | Not demonstrated |
| Buckeye Products Corp. | Final Order | 1954 | New | 1957 | Complied |
| Chyrsler Corp. | | | | | |
| Defense Operations Div. | Order | 1958 | New | | Additions required |
| Michigan Missile Div. | Order | 1952 | New | | Complied |
| Consolidated Paper Co. | Stipulation | 1955 | Additions | | Complied |
| Cross Company | Order | 1956 | New | | Complied |
| Dana Corporation | Order | 1950 | Additions | | Complied |
| Detroit Edison Company | Order | 1956 | New | | Complied |
| Dundee Cement Company | Order | 1958 | New | | Complied |
| E. I. duPont de Nemours and Co. | Order | 1957 | New | | Complied |

## ORDERS AND STIPULATIONS (continued)

| Company | Action | Year Entered | Facilities Required | Year Action Affirmed by Court Decree | Status of Compliance March 27, 1962 |
|---|---|---|---|---|---|
| Ford Motor Company | | | | | |
| Rouge Plant | Order | 1952 | Additions | | Complied |
| Lincoln Div. | Order | 1956 | New | | Complied |
| Chassis Parts Plant | Order | 1955 | New | | Complied |
| Eng. Proving Ground | Order | 1956 | New | | Complied |
| Monroe Plant | Order | 1956 | Additions | | Complied |
| Great Lakes Steel Corp. | | | | | |
| Blast Furnace Div. | Order | 1951 | Additions | | Complied |
| Ecorse Rolling Mills | Order | 1951 | Additions | | Complied |
| Hot Strip Mill | Order | 1959 | New | | Complied |
| General Motors Corp. | | | | | |
| Fisher Body Div. | Order | 1959 | New | | Complied |
| Hoover Ball & Bearing Co. | | | | | |
| Ann Arbor Plant | Order | 1957 | New | | Complied |
| Universal Dye Casting Div. | Final Order | 1953 | New | | Complied |
| Universal Dye Casting Div. | Order | 1959 | Additions | | Complied |
| Hurd Lock & Mfg. Company | Final Order | 1953 | New | | Complied |
| King Seeley Corp. | Order | 1955 | Additions | | Complied |
| McLouth Steel Corp | | | | | |
| Gibraltar Plant | Order | 1956 | New | | Complied |
| Trenton Plant | Order | 1960 | Additions | | Not demonstrated |
| Mills Products, Inc. | Stipulation | 1958 | Additions | | Complied |
| Mobil Oil Company | Order | 1960 | Additions | | Complied |
| National Machine Products Co. | Order | 1956 | New | | Complied |

## ORDERS AND STIPULATIONS (continued)

| Company | Action | Year Entered | Facilities Required | Year Action Affirmed by Court Decree | Status of Compliance March 27, 1962 |
|---|---|---|---|---|---|
| Power Reactor Development Co. | Order | 1961 | New | | Complied |
| Reynolds Chemical Prod. Co. | Order | 1958 | New | | Complied |
| Robin Prod. Co. | Order | 1961 | New | | Complied |
| Shawinigan Resins Corp. | Order | 1956 | New | | Complied |
| Simplex Paper Company | Final Order | 1949 | New | | Complied |
| Spartan Products Inc. | Order | 1959 | New | | Complied |
| Ternes Steel Company | Order | 1959 | New | | Complied |
| Thompson Ramo Wooldridge, Inc. Thompson Prod., Mich. Div. | Order | 1955 | New | | Not demonstrated |
| Wolverine Fabricating & Mfg. Company | Order | 1954 | New | | Complied |

TABLE XVIII

# RECAPITULATION
## ORDERS AND STIPULATIONS
entered by
## WATER RESOURCES COMMISSION
for
## INDUSTRIAL WASTE CONTROL

| River Basin | Final Order | Action Order | Stipulation | Court Decrees Affirming W.R.C. Action | Complied | Status of Compliance by No. of Companies Not Demonstrated | Addns. Req'd. |
|---|---|---|---|---|---|---|---|
| Lake St. Clair-Detroit River | | 9 | | | 8 | 1 | |
| Clinton River | | 11 | | | 8 | 2 | 1 |
| Huron River | | 6 | | | 6 | | |
| Raisin River | 4 | 6 | 1 | 1 | 10 | | 1 |
| Rouge River | | 1 | 1 | | 2 | | |
| Lake Erie | | 2 | | | 2 | | |

MR. OEMING: I think that concludes the presentation of these two state agencies, Mr. Chairman, and I appreciate the opportunity to make this presentation.

THE CHAIRMAN: Thank you, Mr. Oeming. That is a very excellent and comprehensive report. May we ask for questions if we have some. Are there any questions here?

MR. POSTON: I have a question. I noticed that Mr. Oeming has a procedure for comparing the degree of control in the industrial waste outlets, or industrial plants.

MR. OEMING: Yes, sir.

MR. POSTON: Whereby he gives them a grade. I wondered if this same were true for the municipal sewage treatment works, and what is being done relative to the operation of the plants. We know that the large and expensive facilities can be built and have complicated mechanisms and devices there. What is done to assure ourselves that we get good operation in these large and expensive plants we have?

MR. OEMING: May I answer first on the industrial side, and then I think I will refer the second part of the question on municipal wastes to Mr. Pierce.

As you have pointed out, Mr. Poston, the Commission does maintain this grading procedure. We grade all the way through from A through G or F, I think it is, for varying degrees of control. How do we get at this? The State is divided into districts in which, in each district there is assigned an engineer. In the Detroit area there is assigned an engineer and two assistants. They make routine contacts with industry. Observe the operation of the facilities where there is a formal facility and, in addition, which has not been pointed out, but which is a very important aspect of this control, we maintain a boat patrol on the Detroit River. This boat patrol operates during normal good weather conditions when you can get out on a boat, at intervals of three days a week; and, when you cannot get out because of ice conditions, or other problems, we use helicopters or airplanes to make these observations. If we find that something is not up to snuff, the rating for that industry for that year will be dropped so that next year if they had had a bad record and had an oil loss, or a poor record of maintaining the sewage or waste treatment operation, their rating will drop.

Unless I have missed the point there, that covers the industry part of this. Mr. Pierce can answer for the municipal.

MR. PIERCE: For the municipal operations, Act 98 of the Public Acts of 1913 gave to the state health commissioner the responsibility and direction to supervise all sewage treatment works; to enter upon the plants and to inspect them and to determine their accuracy; to see to it that at all times they are adequate, that they are constructed in an adequate manner, and that they are operated properly. This is accomplished specifically by two methods:

Number one, the submission of regular operating reports by the plant staff for the State Health Commissioner. These are submitted monthly and reviewed by the members of the staff. It is accomplished in another way by evaluation on the job, on the spot, by engineers of the Department who, on an average in recent years have visited and observed and consulted with, and evaluated the sewage treatment plants on an average of once each three months -- and average of four times per year. So that there is an almost constant avenue of communication open between the community and the Department, both through the written material and through the face to face observations and interviews.

In addition to this, I should like to say here that we are extremely proud of the extent to which we have been able, in Michigan, to develop an adequate, well trained and competent staff of operators at sewage treatment works. We are one of two states of the fifty states who have a mandatory certification of operators as to competency, a requirement of the statute that is being enforced very thoroughly. We have 100 percent in compliance in Michigan with this requirement that every plant shall have a superintendent in charge, whose competency has been attested to by examinations, and so on, provided by the State Health Commissioner, so that we not only have the opportunity to go in and evaluate these plants and evaluate the operating records, but also have a second line of defense which is extremely important, that is, a competent operator in every plant.

MR. POSTON: Would it be possible for the record to have some statement or report that would show the degree of competency that you find in the operation of plants similar to what Mr. Oeming had, or a rating, so that we know that the plants were producing or were not producing suitable and complete results?

MR. PIERCE: Yes. I should like to make this statement, to emphasize what has been stated earlier today and what is in the written report. Except for those instances where the sewage treatment works are now being expanded or extended, or where they are scheduled for expansion or extension as indicated in the report during the next couple of years, and with the further exception of three or four total installations in this entire southeastern area of the state, the facilities themselves are adequate in relation to the requisites of the Michigan statutes. The operation of these facilities, I would say, is as adequate as you can expect operation to be, sir, on the basis of a well trained staff and recognizing that human weaknesses and frailties, and the frailties of mechanical equipment exist; but, looking at this in a broad sense I should say that the operation is at a very high level, and of a very high order today.

MR. POSTON: Thank you.

MR. DEL A. SMITH (The Izaac Walton League of America): Mr. Chairman, are you permitting any questions from the audience at all?

THE CHAIRMAN: Not just now, but you will be permitted to make a statement as called on by the state and you can cover your points then.

Have you any further questions?

MR. POSTON: No.

THE CHAIRMAN: Dr. Heustis.

DR. HEUSTIS: Those persons who have indicated to Mr. Adams or myself that they would like to make a statement, we have a list of such names. I would suggest that those in the room who are not sure their names are on this list, get in touch with Mr. Adams during the lunch hour to be sure their names are on the list.

Our procedure this afternoon we anticipate will be similar to the procedure this morning. If anyone has a written statement they would like to leave, they may most certainly leave it, and if they would rather be elsewhere this afternoon, their absence will in no way prejudice their statement. It will be properly entered in the record and will be fully considered along with the other material.

Some of the industrial managements contacted me about that specific point. As long as we have the statement it will be entered in the record and will be considered.

Again this afternoon we are going to do our best, with your help, if we can to make the written statements a part of the written record and to discourage as much as we can, within your wishes, the making of oral statements of any length. We will not put the oral statements on the record when we have a written statement unless specifically requested to do so by you.

We aim to come back at a quarter past one and try to get this thing wrapped up.

THE CHAIRMAN: Then we will stand in recess for an hour and a quarter to a quarter past one.

(Whereupon at 12:00 o'clock noon the Conference recessed until 1:15 p.m.)

## AFTERNOON SESSION

THE CHAIRMAN: May we reconvene? Dr. Heustis.

DR. HEUSTIS: The Attorney General's office for the State of Michigan will be represented by Mr. Nicholas V. Olds. We are very hopeful at this point. Mr. Olds has a prepared statement. Mr. Olds' statement is offered and printed for the record and will be a part of it, and unless Mr. Olds specifically requests, his verbal statement will not be for the written record. We are very hopeful, Mr. Olds. We realize that you have been ill and that you will not overdo yourself by spending too long a time at the podium.

### STATEMENT OF NICHOLAS V. OLDS, ASSISTANT ATTORNEY GENERAL, STATE OF MICHIGAN

MR. OLDS: Coming from a Doctor --

Mr. Chairman and ladies and gentlemen:

The purpose of this paper is to supplement the paper presented by Milton P. Adams, executive secretary of the Michigan Water Resources Commission entitled "Administrative Policies and Procedure and State Program -- Statutory Authority." It will discuss: (1) The Supreme Court decisions interpreting the Water Resources Act and its predecessor, the Stream Control Commission Act, as well as the bonding statute, Act 320 P A 1927 as amended; (2) The legal effect of and the impact which the Boundary

Waters Treaty of 1909 has on the State's responsibility with respect to controlling pollution of boundary waters.

### (1) Legal History of Abatement of Pollution of State Waters by Judicial Decisions.

Prior to the adoption of the Stream Control Commission Act in 1929, the Supreme Court of our State had occasion to pass upon the common law authority of the State of Michigan to abate a nuisance created by the pollution of waters by a municipality. In the case of Attorney General ex rel Township of Wyoming v. City of Grand Rapids, 175 Mich. 503, decided in May 1913, the court held that the attorney general acting under his broad common law powers had the authority to file suits on behalf of the State of Michigan to compel the City of Grand Rapids to abate the public nuisance that it was making in the waters of the Grand River by discharging raw sewage therein. In its decree the Supreme Court ordered that the city construct such works as were necessary to abate the pollution within one year.

The march of events, including the outbreak of World War I, delayed construction of these works until the 1920's.

In 1929 the legislature passed the Stream Control Commission Act, namely, Act 245 PA 1929. The constitutionality and authority of this Commission to issue orders requiring the abatement of pollution of the waters of the State was reviewed in City of Niles v. Stream Control Commission, 296 Mich. 650, decided March 11, 1941. In that case the City of Niles appealed from an order of the Stream Control Commission directing the city to begin construction of a sewage treatment plant for the purpose of preventing the discharge of raw sewage into the St. Joseph River. The Supreme Court sustained the authority of the Commission, validated its order and compelled the City of Niles to comply.

In the course of that decision the court made some notable observations, among which is the following:

> "In order to stop pollution of the river, it was necessary for the commission to take action against the city of Niles, inasmuch as it was the first city in the State on the course of the river below the Indiana cities and thus open the way for suit to compel the Indiana cities to stop pollution of the waters of the river. It is an instance where the State must clean up its own back yard before being in a position to ask or seek to compel its neighbor to clean up. This was not an arbitrary exercise of power by the commission but a practical movement toward accomplishment

> of a most desirable end." (Quoted on p. 157, 305 Mich Rep.)

However, the most notable series of cases involved the enforcement of the order which was issued by the Stream Control Commission against the City of Port Huron. On February 11, 1936, the Commission issued an order against the City of Port Huron requiring it "to proceed to the construction of a sewage treatment plant and the necessary collecting and intercepting sewers, pumping stations, force mains and other appurtenances in connection therewith, all when and as approved by the Michigan Department of Health to permit treatment for the sewage of the city before its discharge to State waters." The city failed to comply with this order and the Commission filed a bill of complaint on December 9, 1939 to enforce it. After an extended trial the Circuit Court denied the relief sought by the Commission and the matter was appealed to the Supreme Court. In the course of its opinion (Stream Control Commission v. Port Huron, 305 Mich. 153), reversing the decision of the lower court and validating the order of the Commission, the court referred to the argument made by the city that construction of the sewage plant would not materially reduce pollution in the river and that its present method of sewage disposal did not create a public nuisance to the people residing along the river as well as those in the cities of Marysville, St. Clair, Marine City and Algonac situated within 30 miles below Port Huron. In disposing of this contention, the court stated (p. 157):

> "The record contains sufficient testimony to substantiate the State's contention that the present raw sewage disposal method is a constant menace to the health and well-being of the down-river communities as well as to tourists. This evidence clearly justifies the Commission's order. Under the authority of the City of Niles case, supra, where similar arguments were advanced, it is no defense to a statutory charge of river-water pollution that others have or are contributing to that condition."

A contention made by the city consisted of invoking the doctrines of "balancing of equities" and "comparative injury." These doctrines are always invoked when a number of municipalities or industries contribute to the pollution of a body of water, each one claiming that it should not be required to abate its contribution to the pollution until the others are required to do likewise. In disposing of this contention the Supreme Court said (p. 157-158):

> "Even if we should concur with the

> trial judge in his conclusion that a 'balancing of equities' favors the city, this is not a proper case for the application of that doctrine. The doctrine of 'comparative injury' should be confined to those situations where the plaintiff can be substantially compensated. This principle is distinguished in City of Harrisonville v. W. S. Dickey Clay Manfg. Co., 289 U.S. 334, 337 (53 Sup. Ct. 602, 77 L. Ed. 1208)."
>
> ****
>
> "The doctrine of 'comparative injury' should not be invoked to justify the continuance of an act that tends to impair public health."

Another contention made by the City of Port Huron was its financial inability to comply with the order. In disposing of this issue against the city, the court stated (p. 159):

> "The act creating the commission was under the police power vested in the State, and the order in question was not arbitrary or unreasonable but became necessary by reason of the previous refusal of the city of Port Huron to stop pollution of the

> St. Clair and Black rivers. The evidence justified the order of the commission, and the decree entered below must be vacated.
>
> "We are not unmindful of the situation caused by war conditions and the fact that the city of Port Huron will have difficulty in complying with the commission's order due to necessary materials now required for war purposes. This, however, does not, and should not, prevent the city from immediately taking those steps necessary to insure the carrying out of the mandate of the commission, but a reasonable time should be allowed for completion of the project. We apprehend that the State and city can agree upon the time that is necessary, and if they cannot, this is a matter which can be determined by the trial judge upon proper proofs."

The City of Port Huron, however, failed to comply with the order of the Supreme Court and consequently the attorney general filed a motion for final process to enforce the decree. The court rendered its opinion in People ex rel Stream Control Commission v. City of Port Huron, 323 Mich. 541. In a per curiam opinion reviewing the events that had occurred including reference to war conditions that had made it impossible for the city to procure necessary materials for construction and that time was required for this purpose, and pointing out that the city had authorized the issuance of bonds totalling $1,600,000 for construction of the sewage disposal plant, the court stated:

> "This phase of the situation presents a matter for practical consideration. The problem is one that cannot be solved other than by the construction of proper facilities necessary for the treatment of the raw sewage . . . The condition existing is one, as indicated in the prior opinion of this court, that should be remedied as soon as possible. If the course the city commission claims it is pursuing is followed with reasonable diligence, it seems clear that the desired result can be accomplished in the not far distant future. . . . .
> It seems expedient now that a definite date should be fixed prior to which the sewage disposal plant, the intercepting sewers and other necessary appurtenances shall be completed so that the existing situation may be ended.
>
> "The injunctive relief sought by the motion

> of the attorney general will be granted effective as of October 1, 1950."

Even this, however, did not end the controversy because the City of Port Huron experienced difficulty in selling the bonds to raise the money for construction of the works. Apparently the bonding houses wanted a decision from the State Supreme Court validating these proposed bonds. Consequently, upon the city treasurer's refusal to countersign the bonds, mandamus proceedings were filed by the mayor of Port Huron againt him. The attorney general intervened as plaintiff and the matter was decided by the Supreme Court in Port Huron Mayor v. Treasurer, 328 Mich. 99. In its opinion the court reviewed the prior proceedings, the various resolutions and ordinances adopted by the city for the issuance of the bonds, and the court pinpointed the critical issue as follows (p. 106):

> "The most important question raised by the pleadings is whether the issuance of the general obligation bonds of $1,300,000 must be approved by a 3/5 majority of the qualified electors of the city of Port Huron after due notice has been given to them in the same manner and to the extent that is required for issuance of other general obligation bonds issued under the

charter of the city of Port Huron and by
the home-rule act."

The bonds had not been submitted to the electors for approval and thus the court was faced with the responsibility of deciding whether its previous orders could be complied with without reference to any referendum for the issuance of the bonds to raise the money needed for compliance with the orders of the Supreme Court. Act 320 PA 1927 authorized the legislative bodies of municipalities to issue and sell bonds necessary for the construction of sewage disposal plants "whenever a court of competent jurisdiction in this State shall have ordered the installation of a sewage or garbage disposal system in any of the governmental agencies or municipalities herein mentioned and the plans therefore shall have been prepared and approved by the state commissioner of health. . . ."

Another statute known as the Municipal Finance Act, namely Act 273 PA 1925, contained the same provision with reference to the construction of "necessary storm and sanitary sewers."

After reviewing the various authorities, the court held that whenever a municipality finds it necessary to raise money by the issuance of bonds for the purpose of complying with a court order involving the public health of the State, no referendum of approval by the people is necessary. Its opinion on this point stated:

> "The action of the plaintiffs was in strict accord with our preemptory order for the installation of a sewage treatment system in Port Huron. The proposed bond issue was not to raise money for ordinary municipal purposes or improvements, but to carry out the order of this Court, and prevent defendant from further polluting public streams and endangering the health and comfort not only of its own inhabitants but also of all others in any way affected by the pollution of the waters by the filth from the Port Huron sewers. This no longer created solely a problem of Port Huron but one of the State and this may have been the reason for enactment of Act No. 320, supra, sections of which we have quoted. The order was for the protection of the people of the State of Michigan. It transcended local purposes.
>
> "Claims of the defendant that notice and a vote of the electors of Port Huron were necessary are fully answered by sections 7 and 8 of PA 1927, No. 320, supra.

> The city of Port Huron was bound to carry out the order of this Court, which confirmed the previous order of the stream control commission. There was neither necessity, occasion, nor any reason to publish the resolution authorizing the issuance of the bonds, *nor, as previously stated, did it require the vote of 3/5 of the electors*."
> (Emphasis supplied.)

Another point raised was that the levying of the tax for the payment of such bonds would exeed the tax limitations provided by the city charter. This is a contention which is usually made by municipalities whenever they are faced with complying with an order of the Water Resources Commission. In its opinion the court rejected this contention by holding that there is ample authority in Act 320 PA 1927 to levy taxes for the purposes mentioned in that statute; and that even though the tax limitations were exceeded, such defense was not valid when the city is required to comply with a court order.

The Supreme Court thereupon issued its writ of mandamus ordering the city treasurer to countersign the bonds and in due time the sewage disposal system of the City of Port Huron was built and has been operating ever since.

This series of cases paved the way for the enforcement of the orders of the Water Resources Commission, successor to the Stream Control Commission, and also enabled our municipalities to finance the construction of the works needed to comply with said orders. Consequently during the past fifteen years numerous court orders have been secured against municipalities in order to enable them to take advantage of the issuance of court ordered bonds. Thus no municipality can plead that it is financially unable to comply with the orders of the Commission because financial inability has never been a defense against the abatement of a nuisance either by a private citizen or by a municipal entity.

(2) Effect of the Boundary Waters Treaty of 1909 on the Responsibility of the State and its Municipalities and Citizens to Control Pollution of Boundary Waters.

The State of Michigan has extensive boundary waters in common with our Canadian neighbor. The Detroit River, Lake St. Clair, St. Clair River and St. Marys River are the most important boundary waters that have been the subject of pollution control between our two countries. The last sentence of Article IV of the Boundary Waters Treaty of 1909 existing between the United States and Canada provides:

> "It is further agreed that the waters herein defined as boundary waters and waters flowing across the boundary shall not be polluted on either side to the injury of health or property on the other."

The first task undertaken by the International Joint Commission shortly after it was organized under this treaty was investigation of the pollution of boundary waters. The Commission filed a report initiated in 1912 and completed in 1918. This indicated that many sections of boundary waters were seriously polluted and were endangering the health and welfare of people and property on both sides of the boundary. To resolve this problem, the Commission recommended that the two governments consider granting it extra-territorial authority to abate and place this pollution under control. This suggestion was never followed; and the onset of World War I put it into the background.

Nothing of consequence was done in putting pollution of boundary waters under control until 1946 when the governments of the United States and Canada on April 1, 1946 made a reference to the International Joint Commission as follows:

> "I have the honor to advise you that the governments of the United States and Canada

have been informed that the waters of the St. Clair River, Lake St. Clair and the Detroit River are being polluted by sewage and industrial wastes emptied into those waters. Having in mind the provisions of Article IV of the Boundary Waters Treaty signed January 11, 1909, that boundary waters and waters flowing across the boundary shall not be polluted on either side to the injury of health or property on the other side, the two Governments have agreed upon a joint Reference on the matter to the International Joint Commission, pursuant to the provisions of Article IX of said Treaty. The Commission is requested to inquire into and report to the two Governments upon the following questions:

(1) Are the waters referred to in the preceding paragraph, or any of them actually being polluted on either side of the boundary to the injury of health or property on the other side of the boundary?

(2) If the foregoing question is answered

in the affirmative, to what extent, by what causes, and in what localities is such pollution taking place?

(3) If the Commission should find that pollution of the character just referred to is taking place, what measures for remedying the situation would, in its judgment, be most practicable from the economic, sanitary and other points of view?

(4) If the Commission should find that the construction or maintenance of remedial or preventive works is necessary to render the waters sanitary and suitable for domestic and other uses, it should indicate the nature, location and extent of such works, and the probable cost thereof, and by whom and in what proportion such cost should be borne."

On October 2, 1946 the reference was extended to include the waters of the St. Marys River from Lake Superior to Lake Huron. This reference had its genesis in the complaint registered by the City of Detroit that its source of water supply at the head of Belle Isle was being contaminated by phenolic wastes discharged into the St. Clair River at Sarnia, Canada, by various refining companies. But it will be observed that the reference was broad enough to include not only industrial wastes but also domestic sewage wastes emanating from either side of the boundary.

The International Joint Commission organized various boards to make the investigation of these waters, composed of representatives of the State of Michigan, the U.S. Public Health Service, the Canadian government, and the Province of Ontario. This board was known as the Technical Advisory Board to the Commission.

In 1950 the International Joint Commission completed its investigation and report which was transmitted to the governments of the United States and Canada. These governments indicated approval of the report in 1951. This report was very comprehensive and it contains recommendations with respect to "objectives for boundary waters quality control." For detail as to what these objectives are, specific reference should be made to this report, but in general they include the following:

> "General Objectives
>
> All wastes, including sanitary sewage, storm water and industrial effluents, shall be in such condition when discharged into any stream that they will not create conditions

in the boundary waters which will adversely affect the use of those waters for the following purposes: source of domestic water supply or industrial water supply, navigation, fish and wildlife, bathing, recreation, agriculture and other riparian activities.

In general, adverse conditions are caused by:

(a) Excessive bacterial, physical or chemical contamination.

(b) Unnatural deposits in the stream, interfering with navigation, fish and wildlife, bathing, recreation, or destruction of aesthetic values.

(c) Toxic substances and materials imparting objectionable tastes and odors to waters used for domestic or industrial purposes.

(d) Floating materials, including oils, grease, garbage, sewage solids, or other refuse.

"Specific Objectives

In more specific terms, adequate controls of pollution will necessitate the following objectives for:

(a) Sanitary Sewage, Storm Water and Wastes from Water Craft

Sufficient treatment for adequate removal or reduction of solids, bacteria and chemical constituents which may interfere unreasonably with the use of these waters for purposes aforementioned. Adequate protection for these waters, except in certain specific instances influenced by local conditions, should be provided if the coliform M.P.N. median value does not exceed 2,400 per 100 ml. at any point in the waters following initial dilution.

(b) Industrial Wastes

(1) Chemical Wastes -- Phenolic Type

Industrial waste effluents from phenolic hydro-carbon and other chemical plants will cause objectionable tastes or odors in drinking or industrial water supplies and may taint the flesh of fish. Adequate protection should be provided for these waters if the concentration of phenol or phenol equivalents does

> not exceed an average of 2 p.p.b. and a maximum of 5 p.p.b. at any point in these waters following initial dilution. This quality in the receiving waters will probably be attained if plant effluents are limited to 20 p.p.b. of phenol or phenol equivalents.
>
> Some of the industries producing phenolic wastes are: coke, synthetic resin, oil refining, petroleum cracking, tar, road oil, creosoting, wood distillation, and dye manufacturing plants."

************

In effect, what the two governments did by accepting this report is that they obligated themselves as well as their municipal entities and private citizens and enterprises to achieve the water qualities indicated in the objectives by taking such measures as would be necessary for that purpose. The report indicated that there was ample legal authority resting in the various levels of government in both countries to control pollutional discharges so that these objectives could be attained.

The Detroit River from the head of Belle Isle down to Lake Erie is the stretch of water constituting the subject matter of this conference. If the treaty is to be observed by both nations, then it means that an obligation rests upon the State of Michigan not to pollute the waters of the Detroit River to such an extent that it would cause injury to Canadian interests across the boundary. However, one of the findings of the Technical Advisory Board was that any pollutional substance discharged on one side of the bounday invariably has trans-boundary effects. Under the Constitution of the United States, treaties are made the supreme law of the land, as is specified in Sec. (2) Article VI:

> "This Constitution, and the Laws of the United States which shall be made in Pursuance thereof; and all Treaties made,or which shall be made, under the Authority of the United States, shall be the supreme Law of the Land; and the Judges in every State shall be bound thereby, any Thing in the Constitution or Laws of any State to the Contrary notwithstanding."

Consequently, the requirements of this treaty as well as any treaty entered into by the United States government are binding not only on the government of the United States of America but on the State of Michigan and all of its municipal entities and citizens.

We have appeared on numerous occasions before the International Joint Commission over the past ten years complaining about the fact that the municipalities of Ontario such as Sault Ste. Marie, Sarnia, Windsor, etc. were not complying with the treaty as implemented by the Commission's 1951 report.

It behooves us at this time to consider seriously whether the conditions in the Detroit River fail to comply with the obligations of the treaty; and if so, what we as a State and as a group of municipalities of that State should do to secure compliance. We all know that at the present time Wayne County is constructing a new water system in the Detroit River and that its water intake is located across the boundary in Canadian waters. This means that best efforts should be made on our side of the boundary to protect this water system from degrading the water which it shall receive; and of course there will be an equal responsibility on the part of Canada to do likewise.

Even though the legal machinery which I have described seems to be adequate to put Michigan in the forefront of all the States in its water pollution control program, this does not mean that the coercive powers of the State need be used on every occasion. There is a great area of cooperative action that can be taken by a municipality or by an industry or by a group of municipalities and industries. An example of the fruits that can come from cooperative action is the recent agreements that have been signed by various municipalities with the Wayne County Public Works Department for the construction of interceptors and other facilities that have been needed for a long time to prevent pollution of the waters of the Rouge River and other waters including the Detroit River. What I am trying to say is that municipalities and industries should recognize their responsibilities toward the health of their own citizens and others and meet these responsibilities as much as possible without resort to the enforcement powers of the Water Resources Commission or of the State Health Department.

Water pollution control is a never-ending battle and as our population continues to grow, resulting in an increase in industrial and commercial development, the waters of our State will be subjected to greater demands for waste assimilation purposes. However, it will do none of us any good if we "foul our own nests" so that we will be deprived of the maximum use of the waters that flow by our door step. The legal machinery provided by the State of Michigan is adequate to place under proper control any species of waste discharges whether domestic or industrial. The definition of unlawful pollution contained in Sec. 6 of the Water Resources Act is one of the best in the country.

(Sec. 6 of Water Resources Act: It shall be unlawful for any person to discharge or permit to be discharged into any of the lakes, rivers, streams or other waters of this state any substance which is injurious to the public health or to the conducting of any industrial enterprise or other lawful occupation; or whereby any fish or migratory bird life or any wild animal or aquatic life may be destroyed or the growth or propagation thereof be prevented or injuriously affected or the value of lawfully taken fish or game be destroyed or impaired as the consequence of said pollution. Any person who shall discharge or permit to be discharged any waste or pollution into any of the waters of this state, in contravention of the above provision of this section, shall be deemed to violate the provisions of this Act. (Am. 1949 Act 117))

In every instance where we have had to appeal to the Supreme Court of our State for the enforcement of pollution control orders, our action has been upheld. The legal tools are here to be used and all that is needed is the faith and courage to use them.

I thank you, Mr. Chairman.

THE CHAIRMAN: Thank you, Mr. Olds. Are there any comments or questions? I would like to point out two things, Mr. Olds. As we said at the beginning, that was on yesterday, what we are doing here is confining ourselves to American waters and American pollution, because that is all we have jurisdiction over here. Regardless of the very interesting question of whether a treaty or law of the land governs, I think this is made moot in this situation because Section 12 of the Federal Water Pollution Control Act states, "that this Act shall not be construed as affecting or impairing the provisions of any treaty of the United States."

I think that is pretty clear right in our Act.

MR. OLDS: That is right. In fact, neither any Federal act nor any State act could abrogate a treaty. It is over everything.

THE CHAIRMAN: Yes.

DR. HEUSTIS: Mr. Chairman, may I call the next witness?

THE CHAIRMAN: Yes.

DR. HEUSTIS: Mr. Arthur Elmer, the first of two persons representing the Department of Conservation. Mr. Elmer, do you have a statement?

STATEMENT OF ARTHUR C. ELMER, CHIEF,
DIVISION OF PARKS AND RECREATION,
DEPARTMENT OF CONSERVATION, STATE OF
MICHIGAN

MR. ELMER: Mr. Chairman, I do.

DR. HEUSTIS: Will you present one copy to the reporter, please. Again, Mr. Elmer, this statement will be entered in the record. It would be very much appreciated by us if you would not read it but you are at liberty to make whatever presentation you think is appropriate. Your remarks will not be on the written record unless you so request.

MR. ELMER: It is so short that unless I read it you won't even recognize I have been up here.

Mr. Chairman, conferees, and ladies and gentlemen. My name is Arthur C. Elmer, Chief, Division of Parks and Recreation, which is one of the seven divisions of the Conservation Department. Gerald Eddy is my boss. As such, the Sterling State Park is one of my problem children and it is one of the problems we have come up here to discuss.

Sterling State Park, described on our literature as: 624 acres at the north limits of the City of Monroe, about 7,800 feet of frontage on Lake Erie, with a safe shallow bathing beach, but largely undeveloped. Actually, it is much more than that, it is the only public beach on Lake Erie in the State of Michigan, located strategically between Detroit and Toledo, adjacent to excellent highways and roads. It attracts in excess of one-half million persons annually to its shaded picnic areas and excellent sand beach.

Initially it cost $285,000 and except for a long barrier sand beach, was largely marsh and open water. Hydraulic dredging has now provided some 500 acres of useable land and two lagoons totaling some 100 acres, in addition to greatly improving the beach area. This dredging operation, which covered a period of several years, was undertaken at a cost of more than $1,000,000.

It is on this land and water thus created that we expect to build an outdoor recreation area capable of serving some one and one-half million people annually. Funds now available would permit initial development for an overall program which will probably cost $5,000,000.

Wayne County and the four counties surrounding it have a population in excess of 4,000,000 persons, about 50 per cent of the total population of the state. With swimming waters at a premium and very few outdoor water recreation spots within a reasonable distance from this mass of people, it is most important that the waters of Lake Erie be maintained in the best possible condition for public use and the planned developments for this park are designed with this in mind.

The master plan, as approved by the Conservation Commission, provides for parking spaces for more than 6,500 cars, 26,000 people at any time, 260,000 people in any one day. It provides for a picnic area of 89 acres, beaches of 24 acres and game and lawn areas of 127 acres. One-fourth of the total area is water lagoons, designed to provide fishing and boating in the waters and picnic sites ong much of their shorelines. The plan provides for a major access road from I-75, the limited access highway from Detroit to Toledo. All of these plans will have to be greatly modified if suitable pollution-free conditions in the water of Lake Erie, which lie adjacent to the park, cannot be maintained.

This has already been demonstrated by the falling off of attendance after August 15, 1961, when the Michigan Department of Health directed that the beaches be posted and the water declared unsafe for swimming. Attendance figures since 1950 show a yearly increase, and this increase continued even though, in 1961, the Legislature passed a law requiring that each car entering a State park would require a yearly permit costing $2, or a daily permit costing 50 cents.

Sterling Attendance

| | |
|---|---|
| 1952 | 101,103 |
| 1953 | 400,537 |
| 1954 | 790,112 |
| 1955 | 852,613 |
| 1956 | 692,450 |
| 1957 | 662,484 |
| 1958 | 782,923 |
| 1959 | 1,239,216 |
| 1960 | 911,246 |
| 1961 | 651,726 |

In 1960, the August attendance was 218,034. In 1961 it slipped to 91,544. More dramatic is the loss in attendance after the order was issued in the middle of August, 1961. From August 14 to 31 in 1960, the attendance was 131,875, and from August 13 to 31 in 1961, the attendance was 14,376. Not all this loss can be attributed to the posting of the beach against swimming, but surely the major part of the loss can and must be based on it.

Failure to keep the waters of Lake Erie, adjacent to the Sterling State Park, in a safe condition for swimming, boating, and other water uses, will necessitate a major revision in the planned development of the park and an added cost for development, probably in excess of $1,000,000.

Preliminary studies for swimming pools at Sterling-Monroe State Park indicate the need for three large pools to accommodate the planned population of this popular beach area. Due to the large size of the pools and the unstable soil conditions in the area, the cost of the pools is estimated at $340,000 each, or $1,020,000 for the three pools. This estimate does not include the increased cost of the bathhouses, although the special design of this facility will undoubtedly cause an increase in cost over the original beach-type bathhouse.

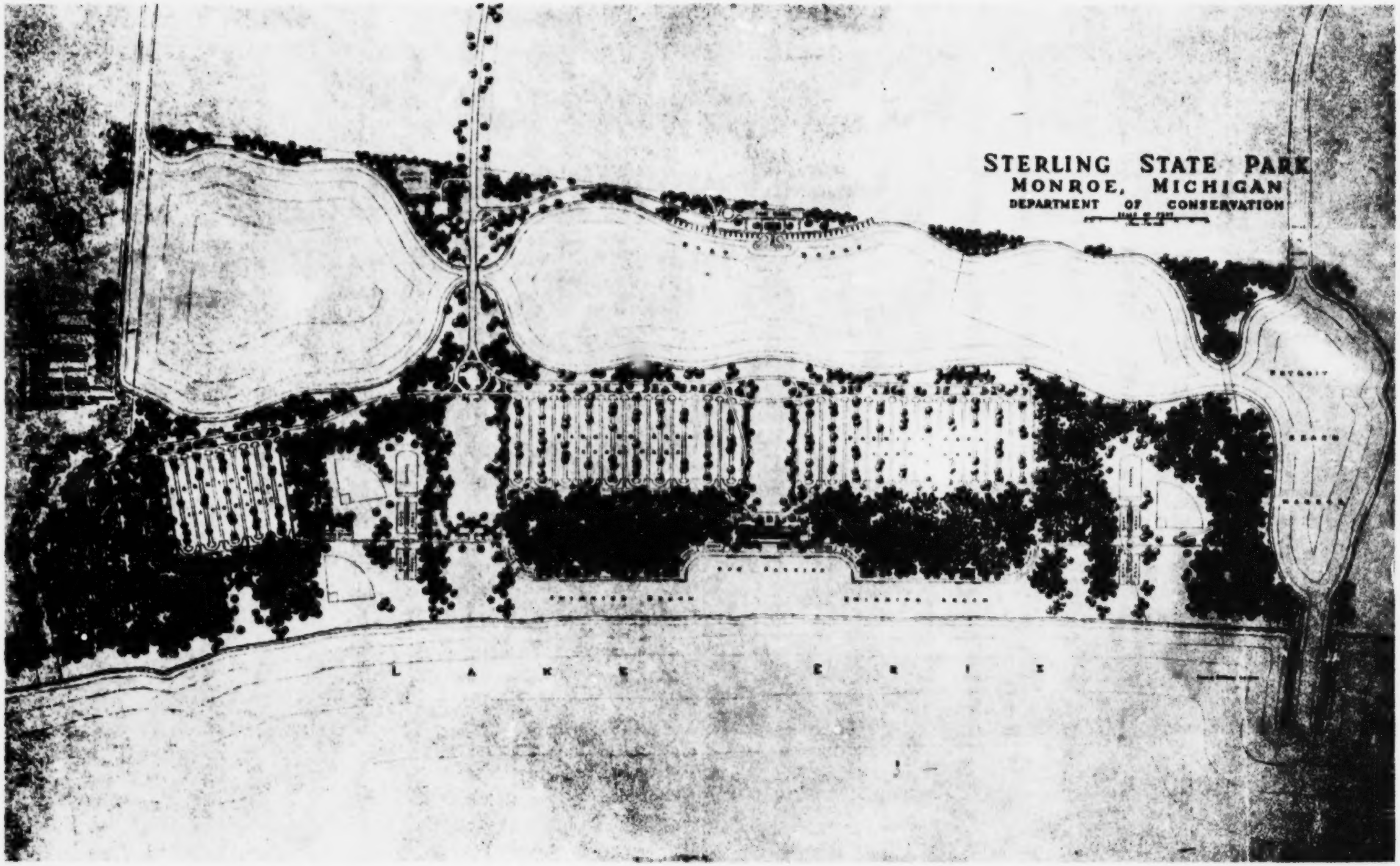
Besides the prohibitive increase in cost of development of the area due to the major revisions in the planned development, we are also faced with the elimination of certain other water activities. Boating, skin diving, water skiing, and other water activities would have to be eliminated. The actual total loss in recreation values is impossible to ascertain, but even the tangible losses will have an increasing effect on the people of this region.

The master plan will be revised. Neither Michigan nor the nation can afford the loss of these great lake waters for recreation and I am extremely hopeful that as a result of this hearing with this tremendous amount of data, that we can shortly find ways and means to remove the "unsafe for swimming" signs from the Sterling State Park beaches.

The master plan attached to this report shows the original plan of development.

(The plan of Sterling State Park, Monroe, Michigan, Department of Conservation, is as follows:)

3669


STERLING STATE PARK
MONROE, MICHIGAN
DEPARTMENT OF CONSERVATION
LAKE ERIE

Thank you, Mr. Chairman.

THE CHAIRMAN: Thank you, are there any comments or questions? Do you think that swimming pools will be as attractive as beach swimming to the patrons?

MR. ELMER: I am sure they would not be.

THE CHAIRMAN: Thank you. Dr. Heustis.

DR. HEUSTIS: Mr. Herb Miller of the Department of Conservation. Do you have a statement prepared?

STATEMENT OF H. J. MILLER, DEPARTMENT OF
CONSERVATION, STATE OF MICHIGAN

MR. MILLER: Yes.

DR. HEUSTIS: Will you give the same to the court reporter.

Mr. Miller's statement is entered into the record and we certainly would appreciate your brevity.

Do you want these pictures put into the record?

MR. MILLER: No, it is not necessary.

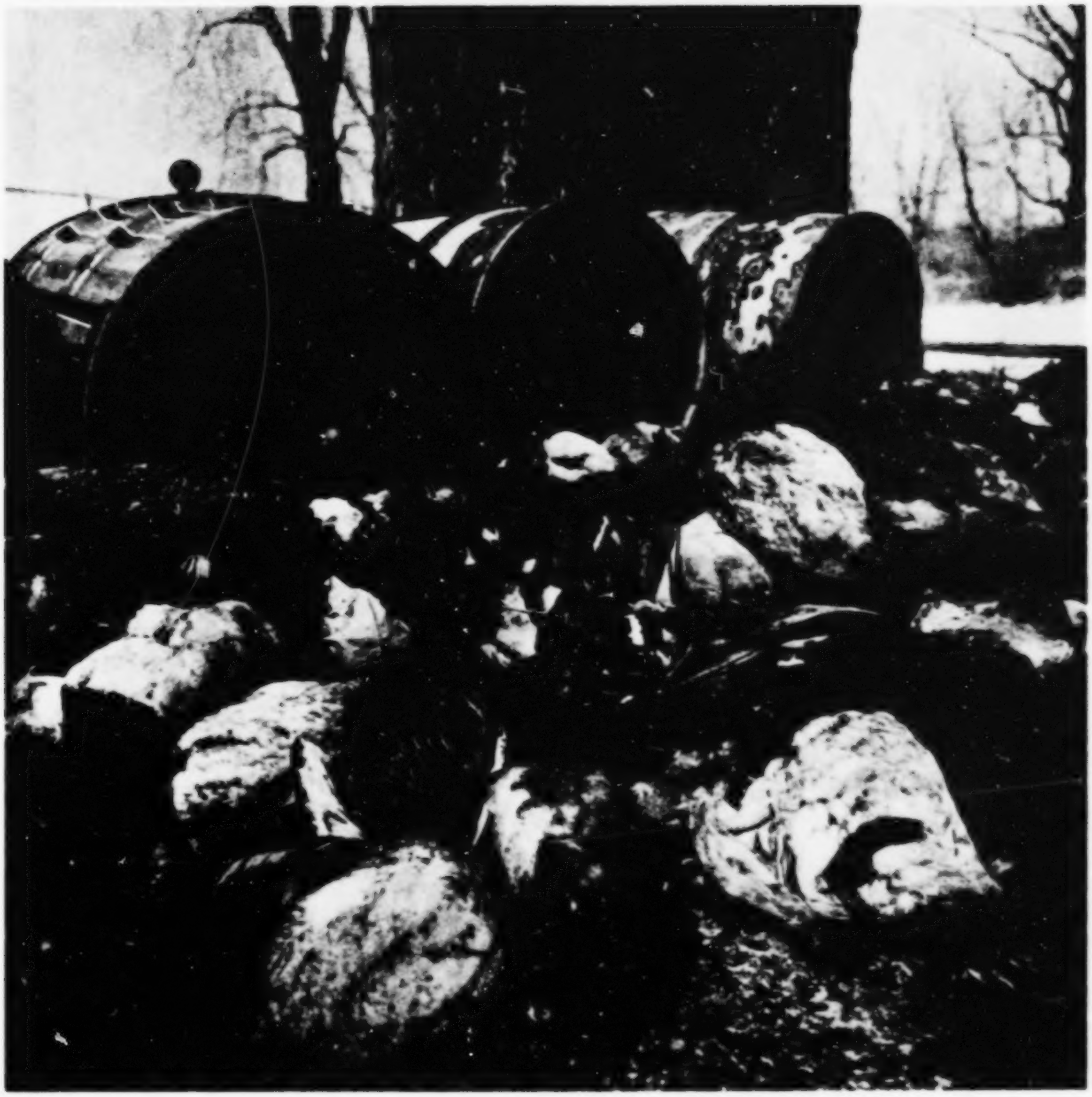
THE CHAIRMAN: If you want these pictures to be made part of the record we will reproduce them and make them part of the transcript.

MR. MILLER: It is perfectly okay.

DR. HEUSTIS: The pictures then will be entered into and made a part of the record.

(The photographs referred to are as follows:)

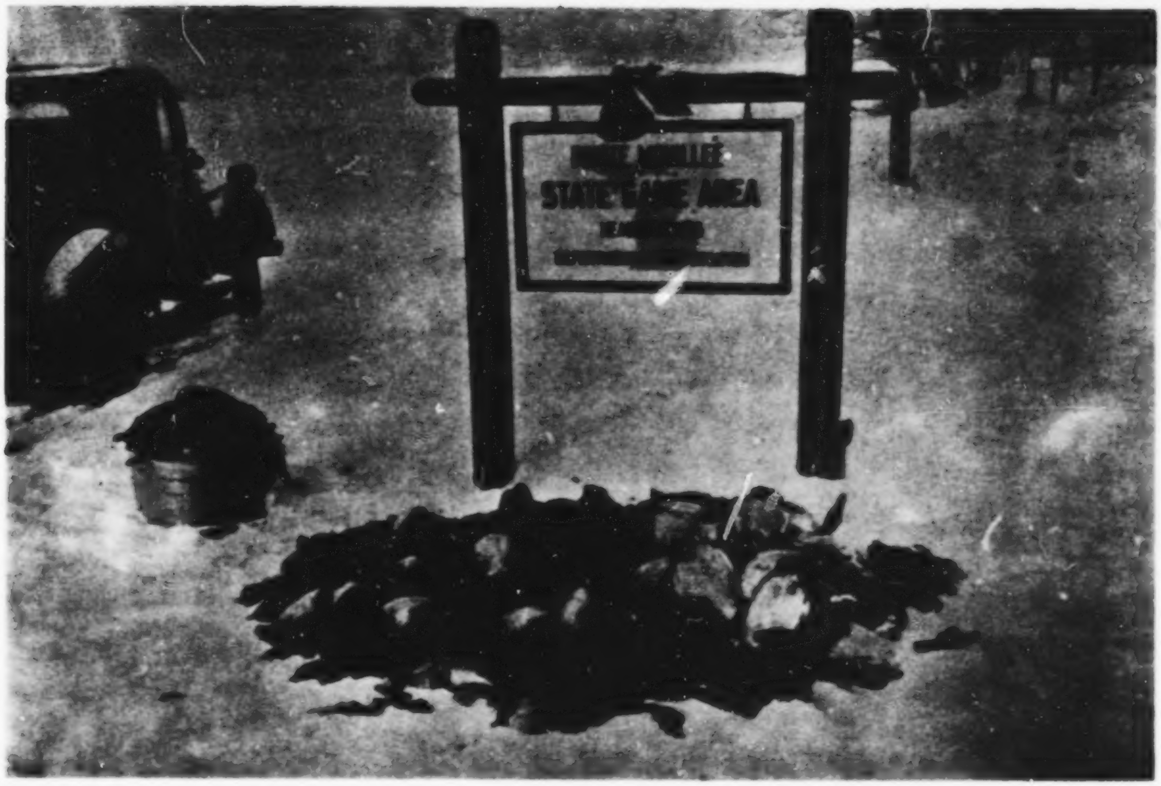
467a



Waterfowl killed by oil pollution on
the lower Detroit River, March, '60

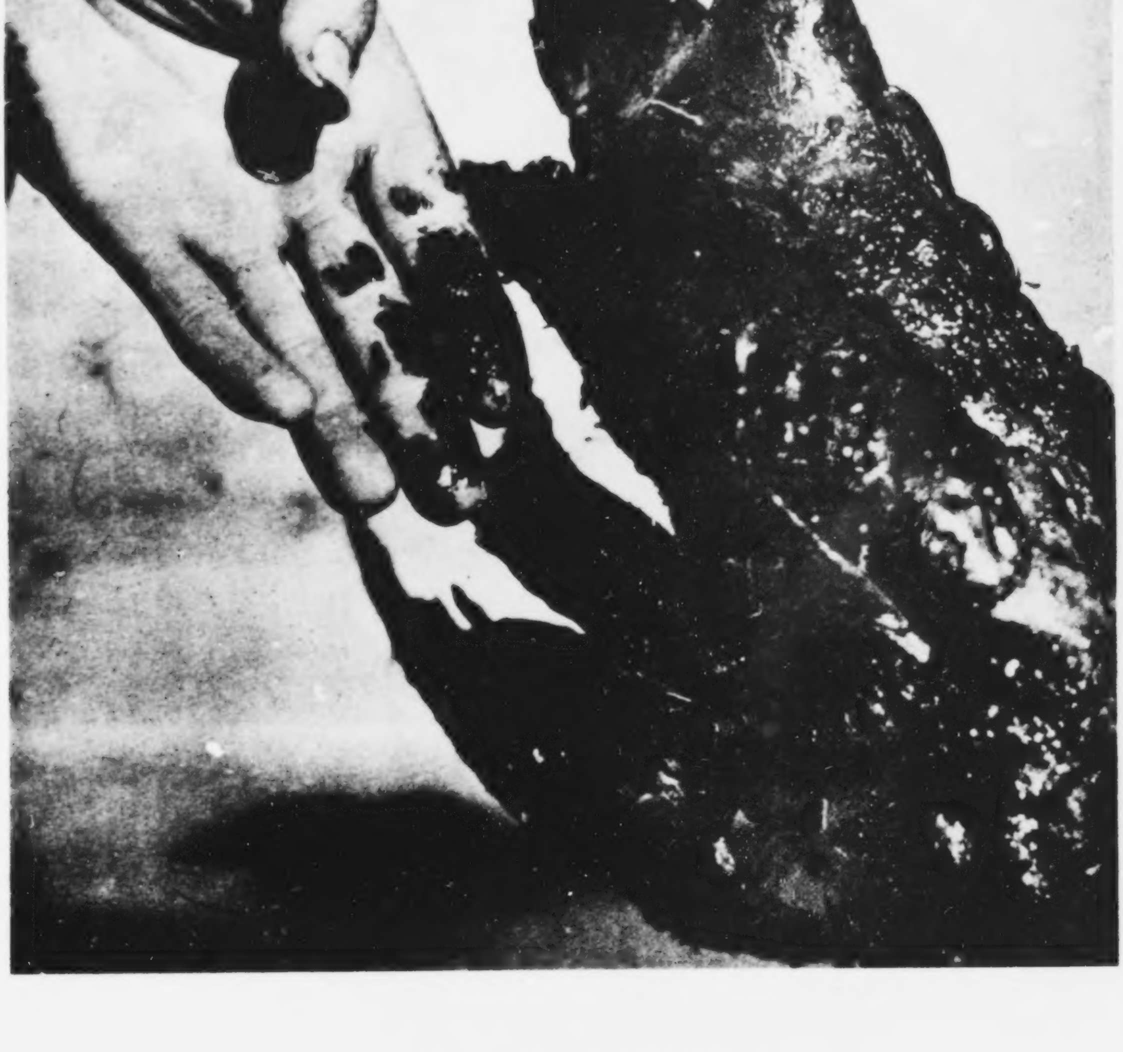
Reproduced from
best available copy.

4672


STATE GAME AREA

Ducks killed by phosphorus poisoning Feb. 1948. Monsanto Chemical Company outlet - Trenton Channel, Detroit

#67C



Heavy tar-like oil on duck picked up on Detroit River, Feb., 1948.

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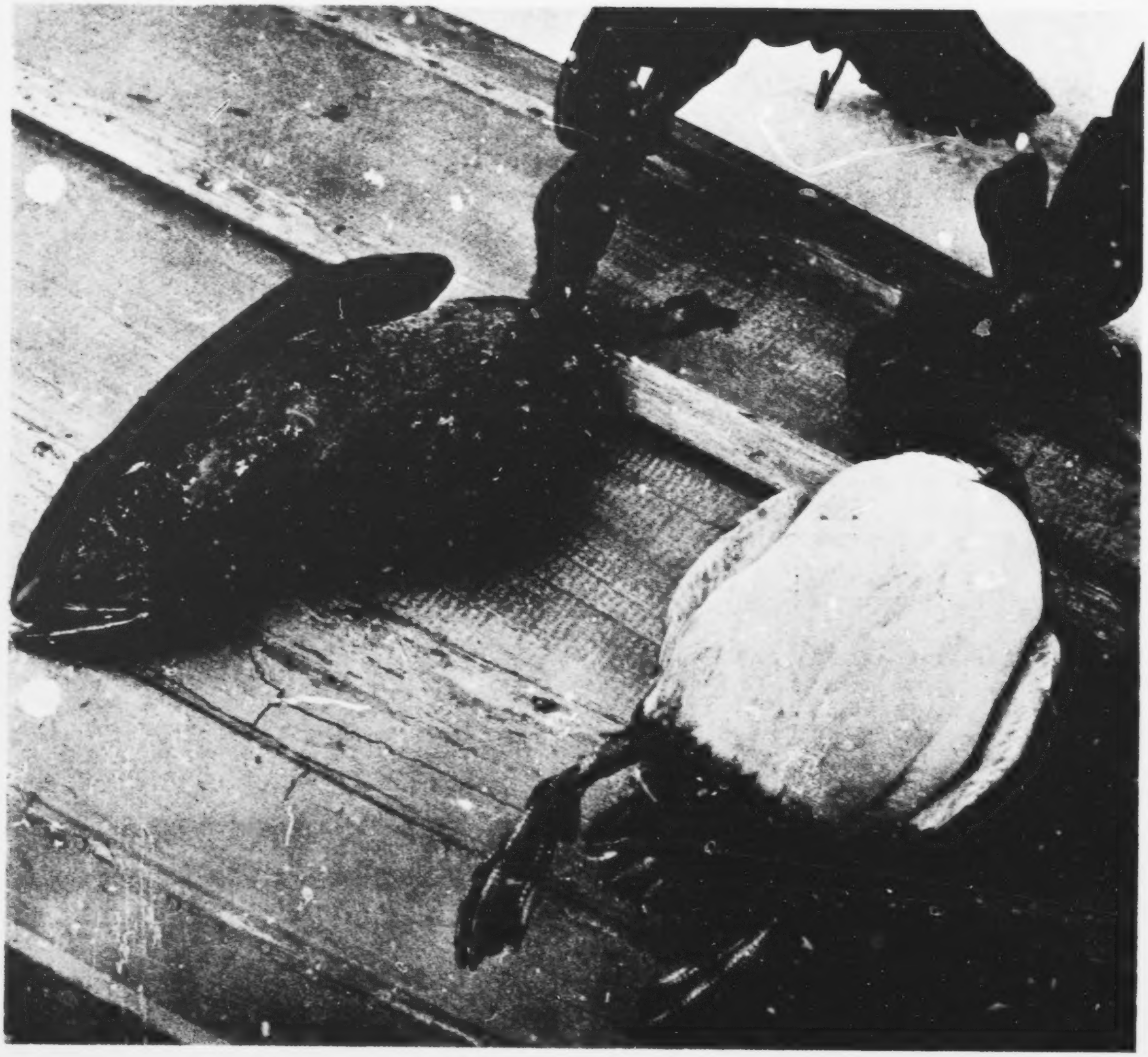
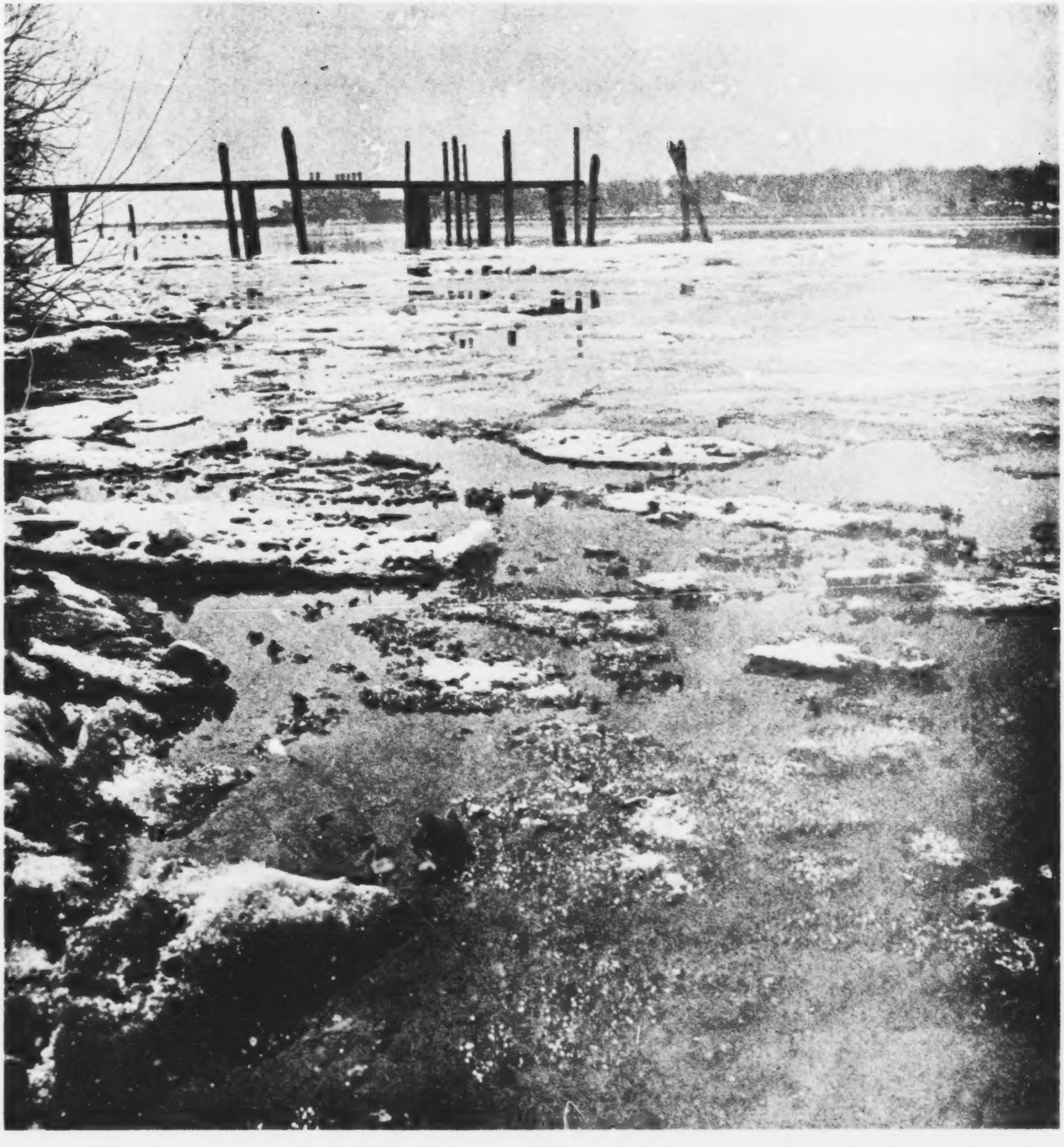
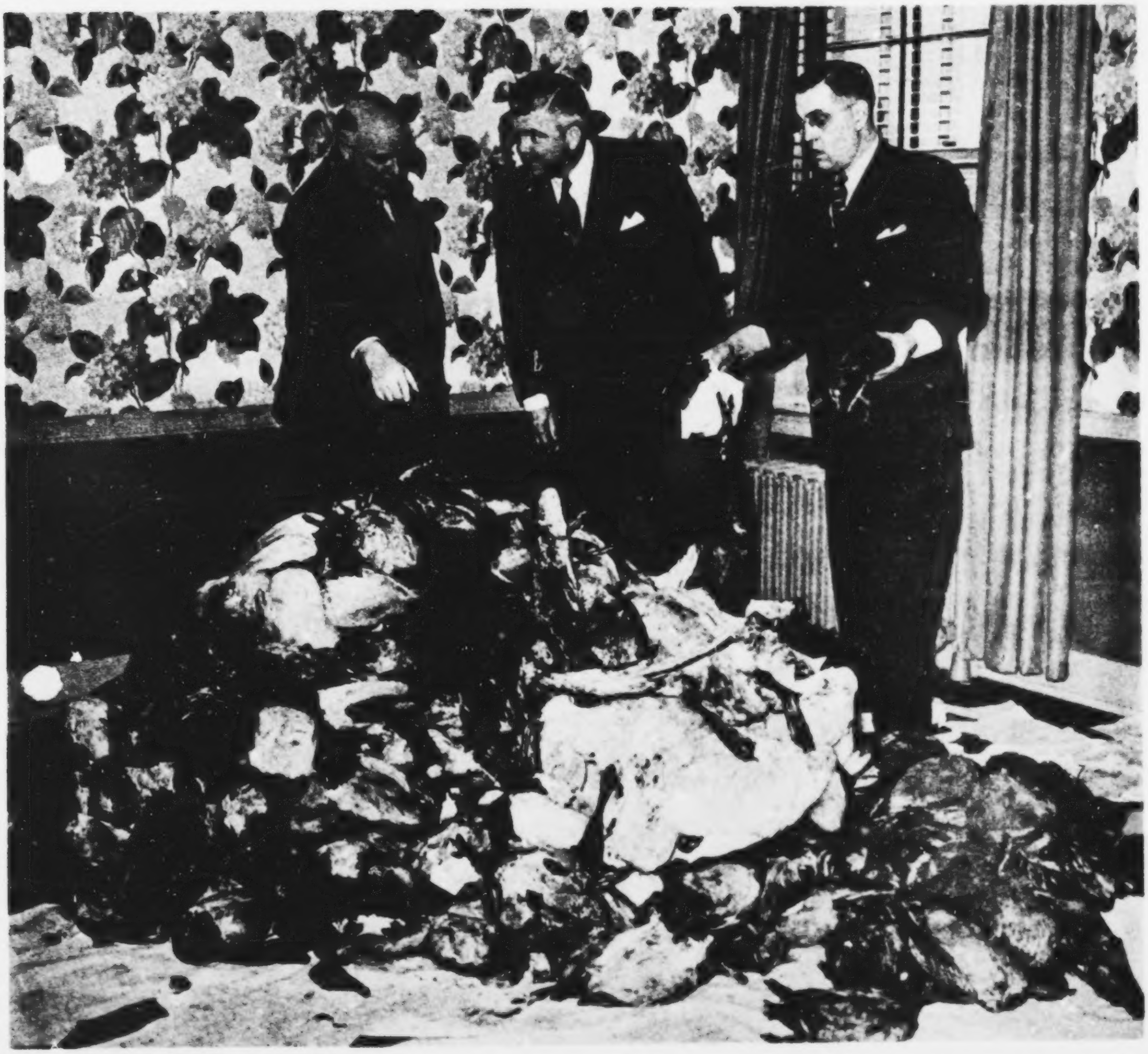


Oil-soaked canvasback compared to
natural coloration.
Detroit River oil flow, March 10, 1960



Close-up of oil pollution on lower
Detroit River, March 1960.

467f



Oil-soaked carcasses picked up on Detroit River, Feb. 1948. Presented as evidence at the Michigan United Conservation Club meeting in Detroit. Note, the carcasses of whistling swan

MR. MILLER: I represent the Michigan Department of Conservation. My statement will be limited to wildlife matters. As a result of pollution, heavy losses of wild waterfowl have occurred on the Detroit River and Lake Erie in many of the past twenty years. The following account of pollution in relation to wildlife is presented in response to a request for such a statement.

For a better understanding of the problems associated with wildlife it may be helpful to review briefly the conditions of the Detroit River area in the early days of the white man.

Recorded observations since the beginning of white man's use of this area provide glowing accounts of the abundance of game and fish that were found here. Father Hennepin's description of the Straits of Detroit in his first passage in 1679 referred to the abundance of game and the productivity of the area. Antoine de Lamothe Cadillac, Commandant during the founding of Detroit, wrote a description to his superiors on October 8, 1701, of the Detroit River which includes the following:

"The fish there are fed and laved in sparkling and pellucid waters, and are none the less delicious for the bountiful supply (of them). There are such large numbers of swans that the rushes among which they are massed might be taken for lilies. The gabbling goose, the duck, the teal and the bustard" (cranes and wading birds) "are so common there that, in order to satisfy you of it, I will only make use of the expression of one of the savages, of whom I asked before I got there whether there was much game there; 'there is so much' he told me, 'that it only moves aside (long enough) to allow the boat to pass.'" (Lajeunesse, Ernest J. -1960. The Windsor Border Region, (Collection of Documents) The Champlain Society for the Government of Ontario. University of Toronto Press.)

Throughout Michigan's history, hunting, fishing, and boating have been important recreational activities. The hunting and fishing clubs that flourished in this part of the state during the past century are evidence of the potential of the area to attract and support wildlife. People traveled great distances to participate in sporting events and to spend their leisure time here.

The Detroit River and Lake Erie in the past have been, and still are, frequented by great numbers of waterfowl, particularly during the spring and fall migration. In addition, many waterfowl and furbearers are produced here.

## General Description

The lower half of the 30-mile Detroit River is more intensively used by waterfowl than the upper because the channels divide and between the channels there are shoals with dense stands of aquatic plants and an abundance of animal foods. Lying below much of Detroit's industrial development, this downstream portion is also more vulnerable to pollution. The upper portion offers good habitat on the west side of Belle Isle locally known as Scott's Middle-grounds.

Lake Erie is an extensive feeding and resting area, frequented by great numbers of ducks and coots, and some geese and swans. The waterfowl habitat here may be classified at 50,000 acres used extensively by waterfowl and approximately 80,000 acres used to a lesser extent. There are also important bordering marshes along the 55-mile shore line; these are used principally by dabbling duck species. The best of these marshes are: Pointe Mouillee State Game Area, Monroe Marshes at the mouth of the Raisin River, LaPlaisance Bay, and the Maumee Bay-Erie State Game Area.

In 1941, a general waterfowl survey was initiated which showed that the Detroit River-Lake Erie area presented special problems. As a result, considerable time was spent there.

A number of special investigations have been carried out in this area since then because serious losses of waterfowl have occurred which were directly or indirectly associated with pollution and thermal changes of these waters. Losses have occurred at various times of the year but most frequently during periods of severe weather.

Prior to the mid-1930's the wintering waterfowl problem did not exist because the shallow, food-rich lower half of the river froze from bank to bank and the narrow, deep, but ice-free upper half supported little food to encourage the ducks to remain during the winter. Then, industrial plants, attracted by what appeared to be an unlimited supply of water, developed rapidly along the lower west bank of the river.

A marked change occurred as industrial effluent warmed the waters to the extent that parts of the lower river were always ice-free. Migrant waterfowl lingered, and for a number of years about 50,000 remained each winter. An unfortunate result of the industrial concentration has been the increasing pollution of the river. (Hunt, George S. and Ewing, Howard E. -1953. Industrial Pollution and Michigan Waterfowl. Trans. N. A. Wildlife Conference 18:366-368.)

Early records of the sport of horse-and-cutter races on portions of the river that now remain free of ice give evidence of the change that has occurred. As late as the prohibition era records reveal "bootlegging" across the ice of the Detroit River.

## Waterfowl Use

Great numbers of waterfowl continue to use this area eventhough it has become heavily industrialized, serves as one of the great shipping arteries of world commerce, has the greatest concentration of pleasure craft on the Great Lakes, and has extensive residential developments.

The birds contribute to the recreation of the people of this metropolitan area and certainly contribute in no small way to their enjoyment. The aesthetic values of these migrant birds appearing in great numbers and in a variety of species are difficult to appraise, but they are nonetheless real, and a part of our heritage.

The estimated waterfowl use of the Detroit River and the western end of Lake Erie (Toledo Harbor to Bar Point, Ontario) as determined by numerous aerial censuses carried out since 1947 is:

Winter - Average 48,000. Populations ranged from 116,000 (mid-January 1959) to as low as 6,000 (mid-January 1962).

Spring - Average 55,000. Populations ranged from 140,000 (early April 1954) to as low as 28,700 (April 12, 1950).

Fall (pre-hunting season) - Average 23,000. Populations ranged from 38,300 (late September 1948) to as low as 14,000 (late September 1957).

Fall (mid-hunting season) - Average 123,000. Populations ranged from 325,100 (late October 1954) to as low as 23,900 (late October 1960).

Fall (post-hunting season) - Average 117,000. Populations ranged from 188,100 (early December 1953) to as low as 15,200 (early December 1955).

(Miller, H. J., et al. Game Division, Michigan Department of Conservation. Report on file.)

These estimates show only populations on a specific day that a census was made and in no way reflect the total number of migrants that may pass through here. To provide a yearly use estimate approximately twenty-nine million waterfowl-use days may be assigned to the Detroit River and

Lake Erie. (Fish and Wildlife Service Report - 1956. Inventory of Permanent Water Habitat Significant to Waterfowl in Michigan.)

National Importance

The national and international importance of waterfowl habitat in the Detroit River area is emphasized in testimony recorded on the establishment of the Wyandotte National Wildlife Refuge during hearings before the Subcommittee on Fisheries and Wildlife Conservation of the Committee on Merchant Marine and Fisheries, House of Representatives, 87th Congress, first session on Law Enforcement Activities. That testimony also includes numerous references to the pollution problem that are pertinent for this present hearing. A copy is being submitted for review to avoid repetition. (Congressional Hearings - Misc. Fish and Wildlife Leg., - 1961. Hearings before the Subcommittee on Fisheries and Wildlife Conservation of the Committee on Merchant Marine and Fisheries, House of Rep., 87th Congress, first session on Law Enforcement Activities. H. R. 1182 - to create the Wyandotte National Wildlife Refuge.)

Briefly, this testimony points out that local, state, and federal agencies have been lax in the enforcement of existing pollution abatement acts.

The establishment of the Wyandotte National Wildlife Refuge last year by an act of Congress emphasizes the interest that federal wildlife people have in saving the Detroit River habitat for wildlife. The national importance of these waters in protecting our waterfowl resources is also demonstrated by the movements of ducks frequenting these waters. Waterfowl banded at the mouth of the river in connection with recent studies by the Department of Conservation have been recovered in twenty-nine different states and six provinces of Canada. (Pospichal, Leo - 1956. Waterfowl Surveys and Investigations on Great Lakes Marshes. Final Report Project No. 45-R - Federal Aid in Wildlife Restoration Act.)

This habitat is of special importance because it is one of the main resting and feeding areas for canvasbacks migrating from their nesting grounds in Manitoba to the east coast with many remaining here for the winter. It is a vital link in the chain of selected areas used as hereditary stopping points. The canvasback is a species in such short supply as to warrant its being placed on the protected list during the last two hunting seasons.

## Surveys to Identify the Problem

A number of surveys and studies have been carried on in regard to mortality of waterfowl in this part of the state. From the evidence obtained there can be no doubt as to the seriousness of the losses due directly or indirectly to pollution of various kinds. These studies started in 1941, were discontinued during the war years, and resumed again after the war. Studies of the types of industrial waste that affect waterfowl are of particular significance to this group.

In order to obtain information, trapping and banding involving some 30,000 ducks was carried out during the winter months from 1949 through 1952. Examinations were made of all these birds to determine weights, species, sex, and age. Periodic aerial censuses of the area have enabled us to secure data concerning migration periods, numbers of waterfowl present in given area, species composition, ice conditions, and extent of mortality.

A map of aquatic food plants was prepared for the lower third of the river and a portion of Lake Erie. The food beds were rated to indicate their value for ducks. Many hundreds of dead waterfowl, picked up in the study area, were autopsied to determine the causes of death. Bacteriological examinations, chemical analyses for toxic substances, and other techniques supplemented the normal type of post-mortem examination. The affects of certain industrial wastes on waterfowl were evaluated by experiments.

In summary, data was gathered from examinations of live-trapped ducks, autopsies of dead birds, and results of experiments.

Records of local weather conditions were kept throughout each winter trapping season. (Hunt and Ewing, 1953, reviewed these findings.) (Hunt, George S. and Ewing, Howard E. - 1953. Industrial Pollution and Michigan Waterfowl. Trans. N. A. Wildlife Conference 18:366-368.)

Mortalities and other Damaging Effects

From these studies and others that followed we learned there are two basic types of mortality, both encountered most frequently in winter. Most spectacular is the mass die-off, occurring for short periods of time and attracting a great deal of public attention. Less obvious are the deaths taking place at a low daily rate but which probably represent a fairly high seasonal total. The mass die-offs usually involve birds of normal weights while birds in the latter group usually are subnormal. Identifying "cause" or "effect" of the various factors that may be involved is difficult and frequently requires a rather thorough check.

In some cases more than one type of pollution was identified as the cause of death but, in general, oil flows were involved.

The more spectacular losses since 1948 follow:

1. February 1948 - minimum estimated loss 10,000; 1,200 birds recovered for examination. (Miller, H. J. -1943 Waterfowl Survey on Saginaw Bay, Lake St. Clair, Detroit River, and Lake Erie. Final

Report Project No. 13-R -
Federal Aid in Wildlife
Restoration Act. Also, Game
Division Report No. 642.

2. October 30, 1948 - estimated loss 1,000; 52 dead ducks recovered. (Miller, H. J. - 1948 Game Division, Michigan Department of Conservation, Report No. 1007

3. March 1949 - 76 dead ducks recovered.*

4. March 1950 - 871 dead ducks recovered.*

5. Feb.-March 1951 - 250 dead ducks recovered.*

6. Oct.-Nov. 1952 - 200 dead ducks recovered.*

7. March to May 1952 - estimated loss 800; 180 dead ducks recovered.

8. 1953 - 226 dead ducks recovered; 119 lost to oil during live-trapping operations.

9. 1954 - 171 dead ducks recovered; 67 lost to oil during live-trapping operations.

10. February 1955 - estimated loss 2,600; 956 dead ducks recovered.

11. February 1956 - 191 dead ducks recovered.*

12. March 1960 - estimated loss 12,000; 1,056 dead ducks recovered. (Foote, James E. - 1960 Game Division Memorandum No. 254, Pointe Mouillee State Game Area)

*reliable estimates of total losses lacking

For clarification the pollutants are discussed separately under the following headings.

## Oil

Regardless of associated complications, oil flows constitute serious factor, whether the effect is direct or indirect. Considerable literature exists attesting to the incapacitating and fatal effects of oil on water birds and on animals. A brief review of these effects will suffice. (1) Oil mats feathers or fur permitting exposure of cold water to reach the skin; (2) starvation may result due to reduced mobility, either swimming or flying; (3) actual drowning may occur; and (4) sickness may result due to ingestion of oil.

In addition to petroleum oils are the greases, fats, and various oily compounds from domestic sewage.

Diving ducks, such as canvasback, redhead, and scaup, abundant here, are particularly vulnerable to oil as these species feed almost exclusively in aquatic areas, and if they cannot go onto the water, will starve or die of exposure during inclement weather.

A study of pollution of the Detroit River, made during 1946-1948 by the International Joint Commission, disclosed that an average of 16,280 gallons of oil entered the river daily. (International Joint Commission - 1951. Report of the International Joint Commission, U. S. and Canada, on pollution of boundary waters. Wash. and Ottawa.)

While the volume of oil on the river has been reduced greatly since that date, oil continues to be a problem. The amount of oil required to impair a duck varies greatly with weather conditions, but studies of oil removed from ducks killed by oil flows show that small amounts can be fatal. Waterfowl exposed to oil have been examined after death and it was found that only one gram of petroleum oil could be extracted from the feathers. (Hunt, George S. - 1961. Waterfowl Losses on the Detroit River, Due to Oil Pollution. Publication No. 7, Great Lakes Research Division, Institute of Science and Technology, University of Michigan)

During periods of mild weather many ducks exposed to oil survive, as evidenced by the examination of ducks bagged by hunters at Pointe Mouillee State Game Area. Examination of 1,629 ducks of all species from October 30 through November 13, 1952, showed 21 per cent had oil on their feathers.

The frequency of occurrence of oil slicks at the mouth of the river during winter and spring periods from 1950 through 1955 was recorded. Oil slicks were noted about one-third of the time. The record follows.

Winter Periods

| Period of observation | Number of days | Number of days oil noted | Per cent of days oil noted |
|---|---|---|---|
| 12-18-50 thru 5-1-51 | 115 | 19 | 17 |
| 12-17-51 " 4-30-52 | 108 | 20 | 19 |
| 12-15-52 " 4-27-53 | 91 | 36 | 40 |
| 12-28-53 " 4-30-54 | 82 | 45 | 55 |
| 1-3-55 " 3-3-55 | 52 | 28 | 54 |
| | Summer Periods | | |
| 6-25-54 thru 8-9-54 | 21 | 12 | 57 |
| 6-15-55 " 8-25-55 | 6 | 3 | 50 |

(Hunt, George S. - 1961. Waterfowl Losses on the Detroit River, Due to Oil Pollution. Publication No. 7, Great Lakes Research Division, Institute of Science and Technology, University of Michigan.

During the 20-month period from August, 1960, to March, 1962, Water Resources Commission personnel made 197 trips on the river to record observations. On these 197 trips the quantities of effluent seen warranted 69 notifications to industry and 43 to municipalities that pollutants were being discharged into the river. Oil occurred in the major portion of the recorded cases. In other words, in 20 months 112 notifications were issued.

Botulism

The first serious losses due to botulism east of the Mississippi River were observed beginning September 10, 1941, in the marshes at the mouth of the Raisin River in Monroe County. Losses were confined to the vicinity of the Raisin River with its heavy load of paper mill wastes. Later in the fall the outbreak spread to the marshes of Maumee Bay near the Ohio state line. Losses were estimated at 10,000 waterfowl. Pollution due to decomposing organic matter dumped into the Raisin River was the principal factor in developing the necessary environment for the growth of the micro-organism (Clostridium botulinum type C).

There was a re-occurrence of botulism in 1942 in late August but the losses were small by comparison. Some domestic fowl were involved. Control was obtained by establishment of a standard for the Raisin River, set as 5 ppm. of dissolved oxygen to control the anaerobic organism responsible for the poisoning. This was accomplished by the Water Resources Commission restricting the discharge of waste or plant effluents entering the river and prohibiting the deposition of settleable waste or sewage solids. (Miller, H. J. -1943. Waterfowl Survey on Saginaw Bay, Lake St. Clair, Detroit River, and Lake Erie. Final Report Project No. 13-R - Federal Aid in Wildlife Restoration Act. Also, Game Division Report No. 642.)

Luckily, we have not experienced botulism losses since the early 1940's.

## Phosphorus

Phosphorus poisoning occurred during the heavy oil losses of 1948. It was specifically identified as it affected, largely, ducks of the type commonly referred to as dabblers, such as black ducks and mallards, which were attracted to a site having a deposit of free phosphorus because grain was placed in the river in an effort to save the "diving"ducks that were immobilized by oil. These birds were concentrated in the ice-free areas and the adjacent river banks below the Trenton plant of the Detroit Edison Company. Combined efforts of the Water Resources Commission, the Conservation Department, and the offender quickly eliminated the source of trouble. (Oeming, L. F. - 1960. Reports on file, Water Resources Commission.)

## Fatty Acids, Solvents, and Detergents

The losses in 1960 were attributed to the wastes from domestic sewage bypassed into the Rouge and Ecorse rivers, combined with oil losses from industries. This was an abnormal loss during construction work carried out by Wayne County. More detail is available in reports in the Water Resources Commission's file. (Oeming, L. F. - 1960. Reports on file, Water Resources Commission.)

There is not enough known as to the effects solvents and detergents may have in the losses discussed here, but the potential for damage exists and must be recognized. We know that small amounts of detergents can waterlog a duck. Small amounts of detergents also are injurious to food plants. As little as 2.5 ppm. of sodium alkyl aryl sulfronate, the active ingredient in detergent, prevents growth of Potamogetons, a favored type of food plant. In this connection, it is important to remember that many industrial effluents may have a disastrous effect on the water plants and minute animals that support wildlife population. The indirect effects of pollution on wildlife may thus be very serious even when no direct losses occur.

## Iron-oxide and Turbidity

Discolored and turbid water inhibits or eliminates the growth of submerged aquatics that serve directly as food for wildlife and also support various forms of invertebrates which provide animal foods.

The red waters of the Trenton Channel and the milky waters of numerous other sources need attention.

A comparison of the number of wild celery (Vallisneria americana) tubers in the lower reaches of the Detroit River shows a 96 per cent decrease in food plants since the establishment of steel plants on the Trenton Channel.

Samples taken in 1954, before the plants were in operation, are compared to samples taken on the same portions of the river in 1958, after the mills were in operation. The finding follows:

| Transect | Number of samples | Tubers per sq. yd. 1954 | Tubers per sq. yd. 1958 |
|---|---|---|---|
| A | 3 | 279 | 10 |
| B | 6 | 312 | 10 |
| C | 3 | 75 | 5 |
| D | 6 | 0 | 0 |
| E | 3 | 54 | 8 |
| F | 2 | 161 | 5 |
|  | 23 | 881 | 38 |

(Miller, H. J. - 1958. Waterfowl Foods, Trenton Channel, Lower Detroit River. Game Division Report No. 2186.)

Water Resources Commission's orders recently forced installation of corrective measures and the iron-oxide problem may be partially solved, but only time will tell. It is our understanding that over 100 tons per day, previously dumped in the river, are now being recovered. Thus, the problem has been partly corrected and a great deal of raw material has been saved.

## Problems Defined

The Detroit River has claimed a heavy toll of wintering ducks over the past two decades. The canvasback and scaup constitute the greatest portion of the annual loss while redheads, black ducks, and mallards are involved to a much lesser extent. The reduction of canvasback and redhead population is especially significant in view of the current low numbers of these species. The factors responsible for losses of these waterfowl and the destructive effects of pollution on waterfowl habitat are complex. With the growth of new industry and the increase in population these problems will become more complicated in the future. If we are to retain our wildlife resources in this area for future generations we must make waste control more effective. Discharge of effluents has occurred over a wide range of attendant circumstances, from wanton disregard of law to pure accident.

To cope with the situation we firmly believe that the monitoring system set up in August, 1960, by the Water Resources Commission is the proper approach. The monitoring procedure, adequately employed, provides for early detection and also provides for identifying the source of pollution when losses occur. Backed by adequate enforcement the present system of vigilant patrol and frequent checks of individual discharge outlets could cope with the enforcement phase.

Also necessary for future controls is additional research. A major problem is the absence of qualitative studies as to (1) toxicity levels of birds and mammals, (2) toxicity levels of aquatic plants and invertebrates, and (3) normal histology of such species of wildlife as waterfowl.

We need to be able to identify the effects of pollution, industrial and domestic, on aquatic plants and invertebrates. We also need to study the effects of thermal changes in these waters.

In retrospect, we started with good quality water and habitat productive of wildlife which, in turn, provide for recreational opportunities in the form of hunting and fishing, and "watching."

In looking to the future we have two clear-cut and opposite choices: (1) permit the Detroit River to degenerate to a situation like that which exists on the Rouge--known to many as a "fermenting, oil-covered, open cesspool"; (2) employ technical skills to meet the pollution problems and adequately enforce abatement regulations to provide for the multiple uses of these waters.

The Detroit River-Lake Erie waters now serve as a vast area of natural wildlife habitat and as a vast area for public recreation. The quality of this water is extremely important, both for people and for the various forms of fish and wildlife which are dependent upon it. Action is needed to resolve conflicts for the uses of these waters. Certainly, these wildlife values and recreational values should be recognized as a major public benefit which must be preserved for the future.

Mr. Chairman, I also have a little supplemental statement with regard to the fish.

THE CHAIRMAN: Do you want to answer questions on these first?

DR. HEUSTIS: May he present the supplemental statement first and then have the questions on the whole works at once?

THE CHAIRMAN: Certainly.

MR. MILLER: The supplemental statement has been filed with you, Mr. Reporter.

Fishing quality in Michigan Waters of the Detroit River and Lake Erie.

A supplemental report pertaining to fishing quality in Michigan waters of the Detroit River and Lake Erie is presented as a part of the Michigan Conservation Department's statement. It is being presented for the Fish Division of the Department, to reduce the number of representatives and to save time.

Data on kinds of fish taken by anglers and on quality of fishing in Michigan waters of the Detroit River and Lake Erie for the years 1928-1960 are on file in the Institute for Fisheries Research of the Michigan Department of Conservation, and are summarized in two attached tables. These angling records are obtained by Conservation Officers and constitute what is known as the General Creel Census. The data are believed to be adequate to detect long-time trends in angling quality and long-time changes in species composition of the catch, but are not adequate for more detailed analysis.

The principal species of fish recorded by the general creel census on the Detroit River are: yellow perch, rock bass, white bass, walleye, sheepshead, smallmouth bass and northern pike. As to long-time trends, the records show a decline in the catch of walleyes during recent years-for 1939-1946 the officers obtained records on 741 anglers who had 677 walleyes; for 1953-1960 the records are for 2,621 anglers who had 510 walleyes. For the other principal sport species in the Detroit River, the records do not show any large change in anglers' catch over the past 20 years; there are relatively few records for the first 10 years of the census (1928-1938).

Over the past 30 years, creel census records do not show any great change in catch per hour (angling quality) by sport fishermen on the Detroit River. During 1928-1960 officers contacted 3,637 anglers who had fished 11,479 hours and had caught 12,290 fish--a catch per hour of 1.07 fish. Catch per hour during the last ten years of the period was somewhat higher than during earlier years; but the greater number of fish caught during the past 10 years was coincident with a decline in catch of the walleye (a large and preferred species).

A netting survey of the fish fauna around Sugar and Stony islands in the Detroit River was made by the Institute for Fisheries Research during September of 1952 (results summarized in Institute for Fisheries Research Report No. 1350.) In 1952 the river in the vicinity of these islands had a rich fauna of native species including food and game species, forage species, and predatory species. Records from the general creel census for the Detroit River do not show any striking changes in anglers' catch since 1952.

For Michigan waters of Lake Erie the general creel census records show that the yellow perch makes up a major portion (about 70%) of the anglers' catch. Other important species include: rock bass, bullheads, white bass, walleye and northern pike. Since 1954 the recorded catch has been mostly perch, suggesting a decline in other important species.

There has not been a marked drop in catch per hour in Lake Erie, but apparently there has been some decline in quality of species composition.

Fishing quality in the Detroit River and Lake Erie compares favorably with angling quality in inland non-trout waters of Michigan, and favorablywith angling quality in other connecting waters of the Great Lakes. In spite of a decline in the walleye population, the sport fishery of the Detroit River and Lake Erie is a valuable recreational resource and should be preserved by protection from pollution.

I have some tables attached to my statement containing the general creel census records for the Michigan waters of Lake Erie and the Michigan waters of the Detroit River for the years 1928 to 1960, which I would like to have made a part of the record.

(The Tables referred to are as follows:)

General creel census records for Michigan waters of the Detroit River, 1928-1960

| Year | Number of anglers | Total hours | Fish | Catch per hour | Small-mouth bass | Large-mouth bass | Blue-gill | Pump-kin-seed | Rock bass | Crappies | Perch | Walleye |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1928 | ...* | 279 | 305 | 1.09 | ... | ... | 10 | 4 | 42 | ... | 244 | 1 |
| 1929 | ...* | 18 | 14 | 0.78 | ... | ... | ... | ... | 2 | ... | ... | ... |
| 1930 | No records | | | | | | | | | | | |
| 1931 | 31 | 114 | 117 | 1.03 | ... | ... | ... | ... | ... | ... | 113 | 1 |
| 1932 | 30 | 129 | 22 | 0.17 | ... | ... | ... | ... | ... | ... | 1 | 2 |
| 1933 | 98 | 530 | 335 | 0.63 | ... | 35 | ... | ... | 34 | ... | 96 | ... |
| 1934 | 44 | 182 | 40 | 0.22 | 3 | ... | ... | ... | ... | ... | 5 | ... |
| 1935 | No records | | | | | | | | | | | |
| 1936 | No records | | | | | | | | | | | |
| 1937 | No records | | | | | | | | | | | |
| 1938 | No records | | | | | | | | | | | |
| 1939 | 75 | 340 | 95 | 0.28 | ... | ... | ... | ... | 35 | ... | 2 | 28 |
| 1940 | 204 | 670 | 234 | 0.35 | 1 | ... | ... | ... | 62 | 12 | 38 | 110 |
| 1941 | 72 | 257 | 159 | 0.62 | 7 | 1 | ... | 2 | 40 | ... | 59 | 44 |
| 1942 | 113 | 362 | 195 | 0.54 | 3 | ... | 7 | 3 | 57 | 1 | 6 | 48 |
| 1943 | 53 | 298 | 115 | 0.39 | ... | ... | ... | ... | 13 | ... | ... | 83 |
| 1944 | 118 | 559 | 386 | 0.69 | ... | ... | ... | ... | 78 | ... | 17 | 227 |
| 1945 | 60 | 269 | 402 | 1.49 | 21 | ... | ... | ... | 4 | ... | ... | 148 |
| 1946 | 46 | 236 | 111 | 0.47 | ... | ... | ... | ... | ... | ... | ... | 89 |
| 1947 | 13 | 34 | 87 | 2.56 | ... | ... | ... | ... | ... | ... | 55 | ... |
| 1948 | 32 | 82 | 34 | 0.41 | ... | ... | ... | ... | ... | ... | 28 | ... |
| 1949 | No records | | | | | | | | | | | |
| 1950 | No records | | | | | | | | | | | |
| 1951 | 27 | 79 | 991 | 12.54 | ... | ... | ... | ... | ... | ... | 991 | ... |
| 1952 | No records | | | | | | | | | | | |
| 1953 | 45 | 189 | 200 | 1.06 | 3 | ... | ... | ... | 35 | ... | 35 | 50 |
| 1954 | 231 | 540 | 1,238 | 2.29 | 1 | 1 | ... | ... | 251 | ... | 63 | 35 |
| 1955 | 580 | 1,750 | 855 | 0.49 | 37 | ... | ... | 2 | 272 | 9 | 131 | 124 |
| 1956 | 233 | 936 | 1,415 | 1.51 | ... | ... | ... | ... | 161 | ... | 319 | 47 |
| 1957 | 271 | 763 | 464 | 0.61 | 5 | ... | ... | ... | 183 | 1 | 131 | 87 |
| 1958 | No records | | | | | | | | | | | |
| 1959 | 658 | 1,294 | 1,417 | 1.10 | 82 | ... | ... | ... | 91 | 1 | 805 | 84 |
| 1960 | 603 | 1,569 | 3,059 | 1.95 | 53 | ... | ... | 8 | 684 | 12 | 1,847 | 83 |
| Total | 3,637 | 11,479 | 12,290 | 1.07 | 216 | 37 | 17 | 19 | 2,014 | 36 | 4,986 | 1,291 |

* Number of anglers not recorded in 1928 and 1929

General creel census records for Michigan waters of the Detroit River, 1928-1960 (continued)

| Year | Northern pike | Bull-heads | Channel catfish | Carp | Suckers | Smelt | Fresh-water drum | Bur-bot | White bass | Chub | Sauger | Red-horse | Muskellunge |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1928 | 3 | ... | ... | ... | 1 | ... | ... | ... | ... | ... | ... | ... | ... |
| 1929 | ... | ... | ... | ... | ... | ... | 12 | ... | ... | ... | ... | ... | ... |
| 1930 | No records | | | | | | | | | | | | |
| 1931 | ... | ... | ... | ... | 2 | ... | 1 | ... | ... | ... | ... | ... | ... |
| 1932 | ... | 7 | ... | ... | 6 | ... | 6 | ... | ... | ... | ... | ... | ... |
| 1933 | ... | 18 | ... | 2 | 1 | ... | 145 | 4 | ... | ... | ... | ... | ... |
| 1934 | 1 | ... | 6 | 13 | ... | ... | 5 | ... | 6 | 1 | ... | ... | ... |
| 1935 | No records | | | | | | | | | | | | |
| 1936 | No records | | | | | | | | | | | | |
| 1937 | No records | | | | | | | | | | | | |
| 1938 | No records | | | | | | | | | | | | |
| 1939 | ... | ... | ... | ... | ... | ... | 8 | ... | 27 | ... | 4 | 1 | ... |
| 1940 | 13 | 1 | ... | ... | 12 | ... | 3 | ... | 1 | ... | 1 | ... | ... |
| 1941 | 2 | ... | ... | ... | 4 | ... | ... | ... | ... | ... | ... | ... | ... |
| 1942 | ... | ... | ... | ... | ... | ... | 7 | ... | 46 | ... | 16 | 1 | ... |
| 1943 | ... | ... | ... | 1 | ... | ... | 1 | ... | 2 | ... | 13 | 2 | ... |
| 1944 | 17 | ... | ... | ... | ... | ... | ... | ... | 46 | ... | 1 | ... | ... |
| 1945 | 2 | ... | ... | ... | ... | ... | ... | ... | 204 | ... | 23 | ... | ... |
| 1946 | ... | ... | ... | ... | ... | ... | ... | ... | 9 | ... | 13 | ... | ... |
| 1947 | 32 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 1948 | 6 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 1949 | No records | | | | | | | | | | | | |
| 1950 | No records | | | | | | | | | | | | |
| 1951 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 1952 | No records | | | | | | | | | | | | |
| 1953 | 8 | ... | ... | ... | ... | ... | ... | ... | 69 | ... | ... | ... | ... |
| 1954 | 15 | ... | 2 | ... | ... | ... | 25 | ... | 845 | ... | ... | ... | ... |
| 1955 | 15 | 2 | 1 | ... | 2 | ... | 73 | ... | 180 | ... | 2 | ... | ... |
| 1956 | 7 | ... | ... | ... | 1 | 1 | 5 | ... | 874 | ... | ... | ... | ... |
| 1957 | ... | ... | ... | ... | ... | ... | 12 | ... | 44 | ... | 1 | ... | ... |
| 1958 | No records | | | | | | | | | | | | |
| 1959 | 11 | ... | 4 | ... | ... | 30 | 257 | ... | 57 | ... | ... | ... | ... |
| 1960 | 8 | ... | ... | 6 | ... | 87 | 87 | ... | 183 | ... | ... | ... | 1 |
| Total | 140 | 28 | 13 | 22 | 29 | 118 | 647 | 4 | 2,593 | 1 | 74 | 4 | 1 |

## General creel census records for Michigan waters of Lake Erie, 1928-1960

| Year | Number of anglers | Total hours | Fish | Catch per hour | Rock bass | Yellow perch | Wall-eye | Northern pike | Bull-heads | Channel catfish | Carp | White bass | Fresh-water drum |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1928 | ...* | 2,301 | 2,168 | 0.94 | 312 | 1,499 | 3 | 24 | 162 | 4 | 6 | 13 | 41 |
| 1929 | ...* | 2,605 | 2,753 | 1.06 | 287 | 2,186 | 134 | 5 | 70 | ... | 8 | 36 | ... |
| 1930 | 595 | 2,086 | 1,529 | 0.73 | 421 | 761 | 42 | 3 | 237 | 7 | 1 | ... | 15 |
| 1931 | 638 | 1,947 | 2,552 | 1.31 | 181 | 1,179 | 111 | 75 | 931 | ... | 31 | 7 | 2 |
| 1932 | 419 | 1,123 | 1,368 | 1.22 | 43 | 790 | 24 | 2 | 418 | 16 | 29 | ... | ... |
| 1933 | 288 | 945 | 1,338 | 1.42 | 66 | 380 | ... | ... | 623 | 15 | 192 | ... | 3 |
| 1934 | 74 | 184 | 446 | 2.42 | 12 | 185 | ... | ... | 224 | ... | 5 | ... | 13 |
| 1935 | 72 | 284 | 830 | 2.92 | 10 | 238 | ... | 1 | 330 | ... | 213 | ... | 15 |
| 1936 | 6 | 16 | 19 | 1.19 | ... | 5 | 4 | ... | ... | ... | ... | ... | 9 |
| 1937 | 89 | 244 | 131 | 0.54 | ... | 95 | ... | ... | 12 | ... | 24 | ... | ... |
| 1938 | No records | | | | | | | | | | | | |
| 1939 | 200 | 924 | 639 | 0.69 | 48 | 253 | 12 | 2 | 56 | 10 | 2 | 2 | 22 |
| 1940 | 112 | 378 | 152 | 0.40 | 18 | 115 | 4 | 12 | 3 | ... | ... | ... | ... |
| 1941 | 136 | 475 | 572 | 1.20 | 34 | 435 | 33 | 1 | 7 | 7 | 15 | 30 | ... |
| 1942 | 812 | 2,928 | 4,691 | 1.60 | 147 | 4,161 | 32 | 8 | 28 | 16 | 1 | 244 | 47 |
| 1943 | 544 | 2,250 | 3,938 | 1.75 | 116 | 3,325 | 145 | 5 | 72 | 45 | 40 | 146 | 43 |
| 1944 | 754 | 2,939 | 4,843 | 1.65 | 258 | 2,792 | 103 | 241 | 298 | 40 | ... | 669 | 238 |
| 1945 | 661 | 2,135 | 2,700 | 1.26 | 17 | 2,470 | 4 | 134 | 25 | ... | ... | 23 | 6 |
| 1946 | 441 | 1,581 | 1,904 | 1.20 | 191 | 973 | 31 | 81 | 1 | ... | ... | 620 | ... |
| 1947 | 669 | 1,861 | 2,719 | 1.46 | ... | 2,286 | ... | 431 | ... | ... | 1 | ... | ... |
| 1948 | 91 | 290 | 512 | 1.77 | 10 | 485 | 5 | 3 | ... | ... | ... | ... | ... |
| 1949 | 358 | 848 | 908 | 1.07 | 19 | 832 | ... | 52 | ... | ... | ... | ... | ... |
| 1950 | 37 | 98 | 160 | 1.63 | ... | 158 | ... | 1 | ... | ... | ... | ... | ... |
| 1951 | 68 | 185 | 924 | 4.99 | ... | 924 | ... | ... | ... | ... | ... | ... | ... |
| 1952 | 1,066 | 5,034 | 3,484 | 1.69 | 1,809 | 4,762 | 636 | 88 | ... | ... | ... | 544 | 443 |
| 1953 | No records | | | | | | | | | | | | |
| 1954 | 119 | 292 | 1,622 | 5.55 | ... | 1,622 | ... | ... | ... | ... | ... | ... | ... |
| 1955 | 326 | 701 | 991 | 1.41 | ... | 942 | 11 | ... | ... | 17 | ... | ... | 21 |
| 1956 | 437 | 1,053 | 885 | 0.84 | ... | 885 | ... | ... | ... | ... | ... | ... | ... |
| 1957 | 55 | 103 | 82 | 0.80 | ... | 77 | ... | 2 | ... | ... | 2 | 1 | ... |
| 1958 | No records | | | | | | | | | | | | |
| 1959 | 364 | 949 | 3,415 | 3.60 | ... | 3,362 | ... | ... | ... | 9 | ... | ... | 44 |
| 1960 | 57 | 274 | 1,329 | 4.85 | 2 | 1,287 | ... | ... | ... | 40 | ... | ... | ... |
| Total | 9,488 | 37,033 | 54,604 | 1.47 | 4,001 | 39,464 | 1,334 | 1,171 | 3,497 | 226 | 570 | 2,335 | 962 |

* Number of anglers not recorded in 1928 and 1929.

General creel census records for Michigan waters of Lake Erie, 1928-1960 (continued)

| Year | Small-mouth bass | Large-mouth bass | Blue-gill | Pumpkin-seed | Crappies | Dogfish | Shad | Sucker | Redhorse | Goldfish | Sauger |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1928 | 11 | 2 | ... | 67 | ... | 1 | ... | 23 | ... | ... | ... |
| 1929 | 2 | ... | 3 | 17 | ... | ... | 3 | 2 | ... | ... | ... |
| 1930 | 15 | 1 | ... | 24 | ... | ... | ... | 1 | 1 | ... | ... |
| 1931 | 1 | ... | ... | 31 | ... | ... | ... | 3 | ... | ... | ... |
| 1932 | 5 | 1 | ... | 40 | ... | ... | ... | ... | ... | ... | ... |
| 1933 | 12 | ... | 13 | 30 | ... | ... | ... | 4 | ... | ... | ... |
| 1934 | ... | ... | ... | 7 | ... | ... | ... | ... | ... | ... | ... |
| 1935 | ... | ... | ... | 7 | ... | ... | ... | 6 | ... | 10 | ... |
| 1936 | ... | ... | ... | 1 | ... | ... | ... | ... | ... | ... | ... |
| 1937 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 1938 | No records |  |  |  |  |  |  |  |  |  |  |
| 1939 | 1 | 32 | 101 | 9 | 87 | 2 | ... | ... | ... | ... | ... |
| 1940 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 1941 | ... | ... | ... | ... | 10 | ... | ... | ... | ... | ... | ... |
| 1942 | 2 | ... | 1 | ... | 1 | ... | ... | ... | ... | ... | 3 |
| 1943 | 1 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 1944 | 2 | ... | 7 | 194 | 1 | ... | ... | ... | ... | ... | ... |
| 1945 | ... | ... | 15 | 5 | 1 | ... | ... | ... | ... | ... | ... |
| 1946 | ... | ... | ... | ... | 7 | ... | ... | ... | ... | ... | ... |
| 1947 | ... | ... | ... | ... | ... | ... | ... | 1 | ... | ... | ... |
| 1948 | ... | ... | ... | 9 | ... | ... | ... | ... | ... | ... | ... |
| 1949 | ... | ... | ... | ... | 5 | ... | ... | ... | ... | ... | ... |
| 1950 | ... | ... | ... | ... | 1 | ... | ... | ... | ... | ... | ... |
| 1951 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 1952 | 122 | 3 | 1 | 36 | 40 | ... | ... | ... | ... | ... | ... |
| 1953 | No records |  |  |  |  |  |  |  |  |  |  |
| 1954 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 1955 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 1956 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 1957 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 1958 | No records |  |  |  |  |  |  |  |  |  |  |
| 1959 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| 1960 | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... | ... |
| Total | 174 | 39 | 141 | 477 | 153 | 3 | 3 | 40 | 1 | 10 | 3 |

THE CHAIRMAN: Are there any comments or questions? I have just one for the purposes of clarification, Mr. Miller. On Page 6 of your original report in your first paragraph you state, "During the 20-month period from August, 1960, to March, 1962, Water Resources Commission personnel made 197 trips on the river to record observations. On these 197 trips the quantities of effluent seen warranted 69 notifications to industry and 43 to municipalities that pollutant were being discharged into the river. Oil occurred in the major portion of the recorded cases. In other words, in 20 months 112 notifications were issued."

Were you here this morning, Mr. Miller?

MR. MILLER: Yes.

THE CHAIRMAN: This morning Mr. Oeming indicated a rating system for the industrial wastes, and Mr. Pierce indicated one for municipal wastes, and both of them seem to indicate that they were almost all operating in a satisfactory manner. I don't think I understand this situation. If they were all being operated in a satisfactory manner how did you find 112 violations?

MR. MILLER: This is a report from the Commission and maybe there is a difference here in identification of notification. It was not a legal summons or a formal request by the Commission as a body, but a statement by the field man who was making the check. Does that clarify the question?

THE CHAIRMAN: It explains it. I don't know that it clarifies it. Thank you.

MR. MILLER: There is pollution occurring, and oil is occurring on the river.

DR. HEUSTIS: I next have a statement to enter into the record. It is a statement by Mr. Keith Wilson of the Waterways Commission of the State of Michigan. Mr. Wilson's statement will be entered into the record at this point and will be given to the secretary.

(The statement referred to is as follows:)

STATEMENT OF THE MICHIGAN STATE WATERWAYS COMMISSION AT THE DETROIT RIVER-LAKE ERIE CONFERENCE, CALLED BY THE U.S. DEPARTMENT OF HEALTH, EDUCATION AND WELFARE, TO ASSIST THE STATE IN IDENTIFYING, AND RECOMMENDING METHODS FOR CORRECTING POLLUTION OF THE DETROIT RIVER AND LAKE ERIE

The Michigan State Waterways Commission is the agency designated by the Legislature and the Governor to represent the State of Michigan on matters pertaining to navigation. Our primary role is to construct refuge harbors and docking facilities for recreational watercraft, but we do participate extensively with the Federal Government and units of local government in the completion of commercial facilities. In this role, we are on occasions requested to participate in conferences and studies relating to watercraft pollution and have gained some knowledge of the general problems in this regard present in the State of Michigan.

As of December 31, 1961, a total of 428,947 watercraft were registered in the State of Michigan. In addition to this number, this agency estimates that there are approximately 100,000 craft not registered or not covered by the registration provisions, making our total recreational boating population approximately 530,000 at the present time. There are a large number of watercraft brought into this State each summer by residents of other states and countries, and estimates of the number of craft involved from this source vary from 100,000 to 400,000, although it is generally agreed that the vast majority of these craft consist principally of outboards towed on trailers.

We do not have accurate statistics on the type of equipment carried aboard recreational craft so that it is impossible to determine accurately the number equipped with marine toilets. However, of the more than 500,000 boats located in the State of Michigan, it is our belief that less than 50,000 of them would contain marine toilets. It is assumed that no more than 20,000 of the craft from other States in use on our waters would be similarly equipped. Since all of these boats are scattered throughout the State along our 3,000 miles of Great Lakes shoreline or on one of our more than 10,000 inland lakes, we do not believe that any single concentration of craft exists sufficient to be a major cause of pollution.

Because watercraft are not generally in daily use and because it is usually more convenient to use shoreside restroom facilities than those provided on boats, we feel that there is a good deal less pollution by recreational watercraft than bare statistics would indicate. However, it continues to be the policy of this agency to cooperate fully with any governmental unit concerned with pollution and/or public health as a result of watercraft activity. We have participated with the Michigan Department of Health and the Water Resources Commission in a study of treatment devices commercially available which could be used on recreational craft to relieve whatever pollution exists from this source, no matter how slight. Unfortunately, there are at present no known commercially available treatment devices for recreational craft which meet current health standards. When such devices are reasonably available and adaptable to such use, and when the need for them is established, this agency has agreed to assist the Water Resources Commission and the Health Department of the State of Michigan in securing the necessary legislation to require their use on the waters of this state.

Our experience in complaints relating to pollution of water by recreational craft indicates that, by and large, the majority of complaints received involve items which have been thrown overboard rather than discharged through a marine toilet. It is a common practice today on the part of commercial ship crews to dispose of garbage and wastes by the simple method of throwing them overboard and much of this garbage and debris is of a nature that permits it to float to the nearest shore where it remains an eyesore or a health factor until removed. It is this type of activity which we believe is reasonably capable of regulation and which should be investigated as a part of this study.

In all of our public docks, trash receptacles are always available and they are emptied regularly to provide a reasonable method of disposing of such materials. Our investigations indicate that recreational boatmen are generally reluctant to dispose of materials of this nature overboard and that they will wait until after docking in order to place the wastes in the receptacles provided for this purpose. This isn't usually much of an inconvenience since very few such craft are equipped to cruise for more than one or two days before having to dock for gasoline and supplies. However, freighters and other commercial craft do not make port so often and the temptation to dispose of their wastes overboard is great when considering the storage problem presented by retaining them on board. The only answer that we can see to the problem is the establishment of enforceable and enforced regulations requiring suitable equipment to be carried on board to provide for the burning or disposing of such waste materials, and we urge the U. S. Department of Health, Education and Welfare to give careful consideration to such a requirement.

I wish to thank you for this opportunity to present this statement and assure you of our complete cooperation in your further studies and investigations of this most serious problem.

/s/ Keith Wilson
Director

DR. HEUSTIS: I would next call upon Mr. Glenn C. Richards, of the Department of Public Works for the City of Detroit. Do you have a prepared statement?

STATEMENT OF GLENN C. RICHARDS, COMMISSIONER,
DEPARTMENT OF PUBLIC WORKS, ROOM 513
CITY-COUNTY BUILDING, DETROIT 26, MICHIGAN

MR. RICHARDS: Yes, I have.

DR. HEUSTIS: Do you care to supplement it or would you like to read it?

MR. RICHARDS: No, I have copies here for the people, and I think they can all read it as well as I can.

Engineers and health officials of Detroit and the surrounding communities have been well aware for many years of the importance of a good sanitary and storm water sewer system to protect the environment and health of our community. Comprehensive studies in the past have indicated -- and we are still convinced of the fact -- that a well designed combined system can adequately handle both storm water and sanitary sewage more efficiently and with adequate protection to health.

Based on these studies, the sewer system and disposal system for the City of Detroit and many of the surrounding communities has been designed and constructed as the area has increased in population. The sewage treatment plant and the interceptors were built to the highest standards at the time of their construction and are well ahead of similar facilities in other metropolitan areas. These facilities have been progressively improved throughout the years.

The most serious nuisance tohealth in the City of Detroit, in the opinion of qualified sanitary engineers and health authorities, is the flooding of basements (both in homes and in business places) during periods of heavy rainfall.

Prior to 1947, basement flooding in the City of Detroit was widespread over the entire area of 140 square miles. From 1943 to 1945, studies were made which resulted in a "Master Plan for Storm-Sanitary Relief Sewers." In 1947 appropriations were made to start construction of the

Master Plan Program.

From 1947 to date, $99,000,000 has been spent, or is encumbered by contract, on the Master Plan Program in addition to the millions spent on improvements to treatment facilities. There remains about $140,000,000 of construction to complete the Master Plan and of this $50,000,000 has already been financed.

Design work on the $50,000,000 program is now proceeding as fast as possible and it is expected that all of the construction will be under contract within four years.

The construction of the major relief outlets of the Master Plan will about double the capacity of the Detroit sewer system. The design of all the outlets of the Master Plan has incorporated the feature of "storm-water storage." The full benefit of this function of the Detroit Relief System will not be fully realized until the system is completed in 1970. However, improvement in operation has accrued with the completion of each new outlet facility.

Two papers, published by Clyde L. Palmer, City Engineer of the City of Detroit, are attached hereto which set forth in some detail the technical basis for the design of stormwater outlets incorporating the feature of "stormwater storage."

Investigation and studies on the problem of handling stormwater in large combined systems are being continued.

One Detroit sewer system has been so equipped that very pertinent data will now become available as storm experiences occur. Studies of this nature are a continuing assignment of the City Engineer's office staff.

In designing and constructing the major interceptor system, full consideration has been given to the engineering feasibility of providing capacity for the many communities adjacent to the City of Detroit. Contracts have been entered into for providing this added capacity on a revenue producing basis so that the areas making use of the services offered by the City of Detroit have had the advantages of the city's planning without undue burden, which would have been impossible for the newer areas to carry during this growth period. Contracts with both Wayne and Oakland Counties have made it possible for these counties to plan their sewage programs without the difficult problem of providing complete sewage treatment facilities of their own. It is quite probable that the entire metropolitan area will be planned so as to make full future use of the Detroit treatment facilities at strategic locations on the Detroit River.

In conclusion, I am sure that a good look at the record will convince the health authorities that Detroit and the neighboring communities are well aware of their responsibilities in providing the best means possible of disposing of both sanitary sewage and storm water and that by joint action a good job of preventing pollution in the receiving waters will be accomplished.

The City of Detroit, the adjacent counties, and our neighboring communities, in my opinion, are in agreement that we are in a good position to continue the good work which has been done and are perfectly capable of making the necessary studies to determine the necessary quality of water for the Detroit River and the contributing streams in this metropolitan area on the basis of high health standards and, therefore, request that the study proposed by local authorities go forward as planned and that the Public Health Service continue to cooperate with local authorities in carrying out the proposed study.

I do want you gentlemen to know that we recognize in a metropolitan area such as this we have many metropolitan problems. One of them, of course, is sanitation, and another is water. We are solving it in this metropolitan area by working together with our neighbors and our State officials. There has been a close relationship in the 21 years that I have been Commissioner of Public Works in the City of Detroit. I have worked on many commissions, working on this problem, and there has been the closest cooperation on it between the county and city and State agencies. We are very proud of our record here and I am sure what will be said and what has been said here will point up the fact that we are making great progress.

There is still some pollution we get, but we are on the job and are spending millions of dollars and have plans for the future, and are going to do the job for Detroit, and do it with the state water and health and resource division. We have plenty of help and have attorneys to enforce the law. There is no question in my mind we have to do this job and we will do it. We ask that this Committee allow us to go ahead with the research and planning division of your Department to carry on the project which we have received a grant for, in cooperation with the rest of the area with the six county supervisors. We will do the job and we hope you will let us go ahead and do it.

DR. HEUSTIS: Would it be agreeable to withhold questions about Detroit at this time?

THE CHAIRMAN: I wonder. We may lose some of this if we do not comment on it at this point. May I make a brief comment on this now?

For one thing I don't think there is any doubt that our Department thinks that in Detroit your area is doing a reasonable job. Otherwise we would not have considered giving you a $100,000 grant, which was awarded.

MR. RICHARDS: We appreciate it.

THE CHAIRMAN: Again, I don't think that the work we are doing here is intended in any way, in spirit, or in law, or in any manner, not to be fully compatible with the work you are doing. As far as your work is concerned, it always becomes a problem to the other cities. For instance, as to Chicago I hope we will refrain, or at least the Federal people will have to refrain from comment because there is a lawsuit there and we are a party to the lawsuit, and we prefer not to comment in a proceeding like this on the Chicago situation. However, in the Potomac River there is a situation which I would like to comment upon. I think it is very interesting that this was brought up.

There have been conferences such as this under the same Act, held in the Potomac River. Two conferences, in fact, were held. There is work going on in the Potomac River. They have a tremendous storm water overflow problem in the Potomac too. We have a schedule established there and by 1966 all parties agree and believe that the water in the Potomac River, and in the vicinity of the Metropolitan Washington area, from a bacterial point of view, will be of swimming water quality. You will be able to swim right up to above Roosevelt Island. Of course there is a problem of silt, but that is another question. I am talking about from a bacterial point of view.

The unsightly nuisances will be eliminated and the water quality will be such that our aquatic biologists tell us it will permit the complete return of the game fish indigenous to that area. This I think we agree shows what a cooperative program can do. We are confidently looking forward to that in the Potomac River.

I live right near the banks of that river and I am sure that the people in this area are probably looking forward to the same kind of thing here also. Dr. Heustis.

DR. HEUSTIS: Mr. Clyde Palmer of the City of Detroit. Do you have a prepared statement?

STATEMENT OF CLYDE L. PALMER, CITY ENGINEER,
CITY OF DETROIT, MICHIGAN

MR. PALMER: Yes, I do.

DR. HEUSTIS: We would hope you might give one to the reporter and will take as little time as you think would be adequate to make your presentation.

MR. PALMER:

## STORM WATER OVERFLOWS FROM COMBINED SEWER SYSTEMS

## DETROIT, MICHIGAN

BY CLYDE L. PALMER

CITY ENGINEER

### Introduction

The intent of this paper is to present the case in favor of combined sewer systems, particularly to serve the Detroit metropolitan area.

There can be little to quarrel with in any effort to protect the water resources of the country from all pollution. It is true, however, that a strong case can be put forward for the reasonable use of water resources to produce a benefit to the greatest number of people, providing, however, that such use does not entirely ignore the needs of minority and special interests groups.

It is the purpose of this paper to show that a properly designed combined sewer system, operated under average conditions, would constitute a reasonable use of the receiving waters of an area, and until there is a fully substantiated proof that occasional use for the disposal of storm overflows is causing damage in excess of the economic benefits, no expenditure of public funds can be justified.

It must be admitted that a separate system may be warranted in the case of a newly developing residential area where storm waters can still be disposed of on the land surface or in open channels. However, it must be pointed out that even this decision is based more on the fact that providing for the immediate need for sanitary service is initially the least expensive than on the merits of a separate system as compared to a combined system.

The case in favor of combined systems will be presented in the following comments supported by data collected at Detroit, Michigan, and pertaining to Detroit's system, and would be most applicable to highly urbanized and complex metropolitan areas.

## Physical Data on Detroit's Sewer System

The City of Detroit, encompassing 140 square miles is roughly triangular in shape with one side of the triangle on the Detroit River and another side on the Rouge River, and is situated on a rather flat plain sloping from northwest to southeast where it is bordered for about twelve miles by the Detroit River.

The highest elevation in the city, along its northerly edge, is about 100 feet above the Detroit River level and the land along the Detroit River is from five to ten feet above the river level.

About three-fourths of the city is drained directly to the Detroit River and the balance to the Rouge River.

The discharge of the Detroit River varies between 180,000 and 200,000 cubic feet per second and beside a long-range cycle of levels of about four feet, there is a seasonal variation of about two feet between the January low and the July high. Short periods of variation of about the same magnitude are occasionally caused by windstorms affecting Lakes St. Clair and Erie.

The storm flow capacity of the Rouge River is about 20,000 cubic feet per second, and the dry-weather flows are about 50 cubic feet per second. A project is now being planned to enlarge the capacity of the Rouge to a capacity of about 30,000 cubic feet per second.

The computed storm run-off, as a result of a ten-year storm on the city, is about 50,000 cubic feet per second, through 67 storm outlets, 15 on the Rouge River and 52 on the Detroit River.

The Detroit sewer system is composed of 2,200 miles of lateral sewers ranging in size from 12 inches to four feet inside diameter, and about 700 miles of public sewers ranging in size from 4 feet to 16 feet inside diameter. The entire system is constructed on the combined plan.

The Detroit sewage disposal system is composed of two sanitary interceptor sewers, one along the Detroit River for about 12 miles, ranging in size from 8 feet to 16 feet inside diameter, and one along the Rouge River for about 15 miles ranging in size from 4 feet to 12 feet 9 inches inside diameter. The two interceptors lead to the Sewage Treatment Plant, located in the southwesterly corner of the city at the confluence of the Rouge and Detroit Rivers. The Sewage Treatment Plant utilizes a primary process composed of a lift station, coarse screens and grit collectors, plain sedimentation, vacuum filtration, incineration, and chlorination, with digester capacity for one-eighth of the solids volume. The plant has capacity for four million people based on 325 gallons per capita per day of sewage flow resulting in a total capacity of 2,000 cubic feet per second. A $32 million program has been approved and is now under way to build a plant up to the full four million capacity and to improve the process from primary to intermediate treatment.

## Characteristics of Low-Intensity Storms

The significance of the study of low-intensity storms and the following data is to emphasize the importance of these low-intensity storms which, by virtue of their number alone, accentuate the problem of controlling storm water overflows. From studies of the U. S. Weather Bureau records at Detroit, Michigan, the following information was obtained concerning low-intensity storms. The information here reported has been excerpted from a paper published by the author in "Sewage and Industrial Wastes," Vol. 22, No. 2, February 1950.

1. Total average rainfall at Detroit, Michigan, during the 76 years of record is 31.47 inches.
2. Of the total annual rainfall, 90% is contributed by storms of 5/10 inch per hour or less.
3. Of the total annual rainfall 50% is contributed by storms of 1/10 inch per hour or less.
4. On the average, there are 157 storms

per year of a trace or more with a duration of 14% of total time.

5. On the average, there are 89 storms per year of 3/100 inch, or more, with a duration of 3% of total time.

6. The above data is most significant in the following discussion.

## Relationship Between Interceptor Capacity, Sanitary Flow, and Storm Run-Off

In the studies of the Detroit interceptor system, it was determined that in terms of the reduction in the number of storm overflows, an interceptor capacity of 150% of the dry-weather flow was most efficient. However, in order to be able to take more of the first flush of storms in local areas, it was decided to establish the interceptor capacity at 324 gallons per capita per day which is equivalent to about 200% of dry-weather flow.

As a result of observations at Detroit, it was concluded that run-off to the sewer system, on the average, did not occur with the usual storm patterns unless the precipitation exceeded 3/100 inch per hour.

Records of the Detroit Sewage Treatment Plant show an average dry weather sanitary flow of about 162 gallons per capita per day. Reducing this to an area basis indicated that the sanitary flow is equivalent to 1/100 inch per hour over the area.

With an interceptor capacity of 200% of the dry-weather flow, allowing a capacity for 1/100 inch per hour of storm flow, it follows that there would be no overflow to the receiving waters unless the storm exceeded 4/100 inch per hour.

Studies of conditions at Detroit show that on the average storms of an intensity greater than 4/100 inch per hour occur for about 2.5% of the total time in 84 separate occurrences, with the total duration of 220 hours per year. As indicated before, assuming there were no diversions to an interceptor, storm overflows to the receiving waters would occur for 3% of the total time in about 89 separate occurrences per year.

Detroit studies indicate that no satisfactory reduction in the number or duration of storm overflow occurrences can be accomplished by any reasonable increase in interceptor capacity.

Summarizing the above statements, it appears that the following conditions obtain.

Due to the effect of interceptor capacity and surface absorption alone, the Detroit system should produce overflows to the receiving waters for about 2.5% of total time in about 84 separate occurrences per year.

On this basis alone, not more than 2% of the total sanitary flow would escape to the receiving waters.

It can thus be said that the Detroit system, without any provision for storm water control, would be 98% efficient in capturing and treating the sanitary flow produced in the area.

Attention is called to the fact that the above statements relate only to the effect of interceptor capacity and surface absorption in reducing the number of storm overflows. Actual Detroit conditions, as a result of the effect of design, produce greater efficiency in the handling of storm overflows and will be discussed in the following portion of this report.

One interesting point of information was brought to light in the Detroit studies of this phenomenon, this being the fact that the animal population of the city is about twice that of the human population.

## Statistical Data

The following data for the last five years is presented in order to demonstrate the effect of "volumetric storage" when designed into a combined system.

The following tabulation shows that the basis information of rainfall occurrence under which the sewer system functioned and is taken from the U.S.W.B. records at the Detroit City Airport and is indicated thus: trace/more than trace.

| | J | F | M | A | M | J | J | A | S | O | N | D | Totals | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1955 | 13/12 | 14/9 | 9/11 | 6/9 | 5/8 | 3/10 | 5/7 | 4/10 | 7/5 | 1/14 | 14/12 | 18/6 | 81/113 | 194 |
| 1956 | 11/9 | 12/11 | 8/14 | 6/12 | 6/17 | 5/8 | 6/11 | 4/13 | 6/7 | 3/4 | 7/10 | 12/15 | 86/131 | 217 |
| 1957 | 15/15 | 7/8 | 5/10 | 11/13 | 2/12 | 3/14 | 1/8 | 6/8 | 4/11 | 5/7 | 6/12 | 10/10 | 75/128 | 203 |
| 1958 | 17/7 | 17/6 | 8/9 | 5/11 | 5/10 | 5/12 | 5/11 | 2/7 | 2/12 | 6/9 | 7/12 | 18/9 | 97/115 | 212 |
| 1959 | 8/15 | 6/13 | 7/14 | 5/16 | 6/13 | 3/6 | 3/10 | 5/12 | 1/12 | 4/14 | 9/12 | 2/15 | 59/152 | 211 |
| | | | | | | | | | | | | | 398/639 | 1,037 |
| | | | | | | | | | | Average Yearly | | | 79/127 | 207 |

A one-year storm at Detroit, Michigan, has been determined to produce 1.20 inches of rainfall in six hours. The following tabulation shows the number of occurrences of rainfalls in excess of 1.0 inches for the last several years.

|  | J | F | M | A | M | J | J | A | S | O | N | D | Year Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1955 | 1 |  |  |  | 2 |  |  |  |  |  | 1 |  | 4 |
| 1956 |  |  |  | 1 | 1 |  |  | 1 |  |  | 1 |  | 4 |
| 1957 |  |  |  |  |  |  | 2 |  |  | 2 | 1 | 1 | 6 |
| 1958 |  |  |  |  |  |  | 1 | 1 | 1 |  |  |  | 3 |
| 1959 |  |  |  | 2 | 1 |  |  | 2 | 1 | 1 |  |  | 7 |
| 5-Yr. Total | 1 | 0 | 0 | 3 | 4 | 0 | 3 | 4 | 2 | 3 | 3 | 1 | 24 |
|  |  |  |  |  |  |  |  | Average Yearly |  |  |  |  | 4.8 |

The significance of comparing the average yearly occurrences of rainfall "first tabulation" with the average yearly occurrences of rainfalls in excess of 1/0 inches is that the volumetric storage of a "one year storm" would reduce the annual number of discharges of combined sewage into the receiving waters to less than five.

## Quality of Storm Water Run-Off from a Metropolitan Area

The proponents of separate systems intimate that the storm water run-off from an area would be a perfectly safe material to be discharged directly to the receiving waters.

Studies at Detroit indicate that this is not the case, at least for a metropolitan area, and that storm water flows from a separate system could be expected to be highly polluted but only in a somewhat lesser degree than storm water overflows from a combined system.

The Detroit data upon which these conclusions were reached was obtained by taking samples of storm run-off from the land surfaces at point of concentration at the street catch basins, starting as soon as run-off occurred and continued during the course of the storm.

The results of the sampling varied quite widely between sampling points and also at the same sampling point during the period of run-off. In some cases the quality of the material became worse as the storm progressed and in others it became better, and in still others no pattern was apparent.

Due to lack of time and opportunity, the Detroit data is limited, but all of the results support contention that storm water run-off from highly urbanized and highly populated areas is heavily polluted and would be very little less objectionable in the receiving waters than the run-off from combined sewers.

The following data shows the results of sampling storm water run-off from Detroit streets as described in foregoing paragraph entitled "Quality of Storm Water Run-Off from a Metropolitan Area."

Due to the exceptionally dry summer in the Detroit area, only a limited number of samples of surface run-off could be obtained. However, the results were as follows:

| Sample | MPN | Sus. Solids | Vol. Solids |
|---|---|---|---|
| Storm of 7-13-60 | | | |
| L-1 | 150,000 | - | - |
| L-2 | 230,000 | - | - |
| Storm of 7-26-60 | | | |
| C | 2,300 | - | - |
| L | 43,000 | - | - |
| Storm of 9-12-60 | | | |
| 1 | 2,300 | 453 | 210 |
| 2 | 2,300 | 257 | 92 |
| 3 | 9,100 | 120 | - |
| 4 | 93,000 | 714 | 300 |
| 5 | 3,600 | 288 | 116 |
| 6 | 9,100 | 177 | 96 |
| 7 | 150,000 | 110 | - |
| 8 | 7,300 | 348 | 115 |
| 9 | 9,100 | 81 | 40 |
| 10 | 23,000 | 179 | 114 |
| 11 | 9,100 | 86 | - |
| 12 | 15,000 | 107 | 90 |
| 13 | 3,600 | 114 | 94 |

| Sample | MPN | Sus. Solids | Vol. Solids |
|---|---|---|---|
| 14 | 3,600 | 328 | 196 |
| 15 | 3,600 | 146 | 107 |
| 16 | 9,100 | 125 | 93 |
| 17 | 93,000 | 98 | 81 |
| 18 | 15,000 | 102 | 75 |
| Storm of 9-19-60 | | | |
| 1 | 9,100 | 98 | 34 |
| 2 | 23,000 | 151 | 62 |
| 3 | 430,000 | 90 | 38 |
| 4 | 230,000 | 71 | 18 |

NOTE: All of the above samples were taken at different locations at different times during the progress of the storm. In the storm of 9-12-60 each sample from 1 to 18 was taken at different locations, starting with number one at 1:15 p.m. and ending with number 18 at 2:05 p.m.

If, by some means, with unlimited manpower and funds, a separate system could truly be kept separate, Detroit studies indicate that the pollutional load resulting from a separate system would be comparable to that produced from a combined system.

## Economics of Separate vs. Combined Systems

Studies made at Detroit indicated that in an unsewered area the cost of a separate system would be about twice that of a combined system if the complete separate system was constructed at one time. Studies also showed that in an area already served by a combined system, the cost of changing over to a separate system would require an additional expenditure of over twice the cost of the original combined system.

Newly developing areas should examine all economic factors closely before they commit themselves to what is the lesser expense initially with a separate system, but a far more burdensome financial load later on.

The high cost of sewers seems to support the case for separate systems and certainly the first need of a newly developed area is for sanitary sewers, leaving the storm water drainage to natural water courses of the land.

If the area remains small and residential in nature and character, perhaps the problems experienced in a highly urbanized area with complex land uses will never develop and a separate system might continue to be satisfactory.

### Maintenance of Separate Systems

In the case of a highly urbanized and complex area certain problems develop which eliminate any advantages that a separate system may have.

The matter of maintaining the physical separation of the two-sewer system is an impossible task in any major sewer system.

The operational problems involved in maintaining a separate system as a separate system have not been successfully solved, particularly in large and extensive systems. Either by stealth, or ignorance, or good intention, sanitary connections improperly find their way into storm sewers where the separate system is in use. Large systems would require policing on a major scale to discover sanitary connections made surreptitiously into the storm sewers, and experience at Detroit indicates that a completely separate storm and sanitary sewer system can never be successfully protected from this type of misuse.

## The Effect of Volumetric Storage on the Reduction of Storm Overflows

Combined systems can be operated to produce results in every way as satisfactory as those produced by separate systems at far lesser construction cost.

The volumetric storage capacity of a sewer system, if provisions are made in the design to adapt this feature to the function of storing storm water, can be of major importance in significantly reducing the number and duration of storm overflows.

In the Detroit area, theoretically, there are on the average 84 storms per year that will produce run-off to the receiving waters. In other words, exceeding the capacity of the interceptor to capture the first flush of storm overflows.

A one-year storm produces 1.2 inches of run-off in six hours, or an average rate of 2/10 inch per hour, and all storms of a one-year intensity or less account for 19 inches of the total average annual rainfall of 31.47 inches. Detroit studies also show that on the average, less than five storms per year occur that exceed a one-year intensity.

In substantiating these statements, the precipitation records of the Detroit area show the following number of storms significantly greater than 1.2 inches for the years indicated: 1955 - 2, 1956 - 4, 1957 - 3, 1958 - 3, 1959 - 5.

From my own personal observations of the outlet of a system that has less volumetric storage than required for a one-year storm, the statistical conclusions stated above have been verified. Conclusions reached at Detroit and substantiated by field data are that the designing of "volumetric storage" into a combined system can greatly reduce the number of storm overflows per year (from 84 to 5 or less) and possibly without any additional cost for structures.

## Conclusions

In summarizing the foregoing comments the following appear to be the significant conclusions.

Any properly designed and constructed combined sewer, without making use of the storm water storage, will produce results in the range of 98% efficiency and any expenditure of public funds to improve its operation should not be made until necessity can be clearly shown.

The adoption of the plan of designing storm water storage into combined systems to the extent possible or desirable, will increase the efficiency of any combined system correspondingly.

Generally speaking, the designing of storm water storage into a combined system increases the cost very little. Adding this feature to an existing system would cost more but would still not be a major expenditure.

Separate systems will discharge to the receiving waters with every storm exceeding 3/100 inch per hour, or about 89 times each year, and the quality of the storm-water discharge will be objectionable and closely comparable to that from a combined system.

Combined systems, designed to make use of "volumetric storage" for the containment of storm water, and based on the volume of a one-year storm, would discharge to the receiving water only from three to five times each year, with a duration of about 4/10% of total time, which corresponds to an efficiency of about 99.6%

We believe that the only conclusion that can be reached from the foregoing statements is that properly designed combined systems, utilizing the feature of storm water storage, would produce results compatible with the reasonable use of the country's water resources.

## SUPPLEMENTARY INFORMATION
## TO THE REPORT ON
## STORM WATER OVERFLOWS FROM COMBINED SEWER SYSTEMS
## DETROIT, MICHIGAN

The following data will indicate the extent to which the Detroit System is now making use of the effect of storm water storage in controlling quality of storm water overflows.

The total capacity of all storm outlets in the City of Detroit is 48,419 cubic feet per second. Of this quantity 36,971 cubic feet per second incorporates the feature of storm water storage, and the balance of 11,273 cubic feet per second only to a limited degree.

It should be noted that in the volumetric storage contained in the outlets indicating a total of 36,971 is one of the largest of the numerous Detroit systems, namely the Conner Creek system, and this system has the capacity for storing storm water significantly greater than the quantities involved in the so-called one-year storm. This is a major portion of the Detroit system and as new relief outlets are constructed we will approach this degree of control over the balance of Detroit's system.

Previous data submitted in the report, of which this is a supplement, as to the effect of storing a one-year storm, indicates that of the 89 run-off-producing-storms in a year, 84 would reach the receiving waters if the feature of storm water storage had not been incorporated, but with the incorporation of the storm water storage feature, the run-offs would be reduced to about four or five per year.

## STORM WATER QUALITY

In a published report on the same subject dated February 1950, which is made a part of this testimony, some evidence was presented on the quality of storm water overflows indicating that on the average 4,300,000 coliforms per 100 milliliters could be expected. However, it should be pointed out that this number would probably be in the range of 300,000 coliforms per 100 milliliters depending on the intensity of the storm producing the run-off.

It further pointed out that with storm water storage the volumes of diluting storm water included in the overflow would approximate that which might occur during a maximum storm.

It should be further noted that these quantities are prior to initial dilution. After initial dilution has taken place the coliform numbers would be further greatly reduced, probably in the range of 50,000 coliform per 100 milliliters. These same results could be deduced from the records at the sewage treatment plant, which indicate the average coliform MPN of the Detroit primary tank effluent before chlorination, is about 15,000,000 per 100 milliliters.

As a point of information, it is generally admitted in the literature that over one billion bacteria can be accommodated on the head of an ordinary common pin, and the average flow in the Detroit River is approximately 50,000,000 (100 milliliters) per second.

Although additional field data is required to validate these computations, the data that is now available leads us to the one conclusion that the operation of Detroit's combined system incorporating storm water storage will produce results in the receiving waters equal to or better than the conditions which would result from the nearly 100 storm overflows that would occur on the average each year if the Detroit system had been constructed as a separate system.

(A statement presented by Mr. Palmer is as follows:)

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# THE POLLUTIONAL EFFECTS OF STORM-WATER OVERFLOWS FROM COMBINED SEWERS *

BY CLYDE L. PALMER

*Sanitary Engineer, City Engineer's Office, Department of Public Works, Detroit, Mich.*

## Introduction

Within the last few years, there has arisen a popular demand for the abatement of stream pollution and all sanitarians certainly agree with this movement in principle. As is often the case, however, the tremendous surge of an awakened public interest may carry any cause far beyond justifiable limits. The demand is made that all pollution must be abated without evaluating the cost of the damage that would result by depriving individuals or municipalities of the reasonable use of their water resources. Pollution caused by storm water overflows from combined sewer systems has been condemned and perhaps rightly so, but before public or private resources are dissipated in an effort to eliminate entirely all stream pollution, it might be well to appraise the problem both as to the possibilities of reaching the ideal objective and the results that can be accomplished within practical limits.

In the discussion of the problem of abating stream pollution, little if any distinction is made between the pollution caused by storm water overflowing from a combined sewer system operating in conjunction with diversion works and sewage treatment facilities and the pollution caused by the direct and continuous discharge of sanitary sewage to receiving waters.

The case against the direct and continuous discharge of sanitary sewage has long since been proven, and as to the necessity for abatement, all sanitarians agree. The nature, extent, and methods of abatement of the pollution caused by storm overflows from combined sewers are not so well defined and are the subject of this discussion.

## Characteristics of Low-Intensity Storms

Preliminary to the study of the pollutional effects of storm-water overflows from combined sewers, it is necessary to investigate the characteristics of low-intensity storms, which are obviously the most numerous, and, consequently, the most important in this particular study. The accompanying diagrams were prepared from the data of the U. S. Weather Bureau and City of Detroit records. Figure 1 indicates that 90 per cent of the annual rainfall in the Detroit area is contributed by storms having an intensity of 0.50 in. per hr. or less, and about 50 per cent by rainfall of 0.10 in. per hr. or less. Figure 2 indicates that, on the average, 157 storms occur per year in amount of a trace or more, and that about 89 storms per year occur that are 0.03 in. or more in amount. Figure 3 indicates that, on the average, 14 per cent of the total time at least a trace of rain is falling, and 3 per cent of the time, it is raining 0.03 in. per hr. or more.

In studying the results of the foregoing storm data, it is first assumed that the effects of rainfall will be imposed on a combined sewer system provided with diversion works to pass the sanitary flow to the collecting inter-

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* Presented at 24th Annual Conference, Michigan Sewage Works Association; Traverse City, Mich.; May 23–25, 1949.

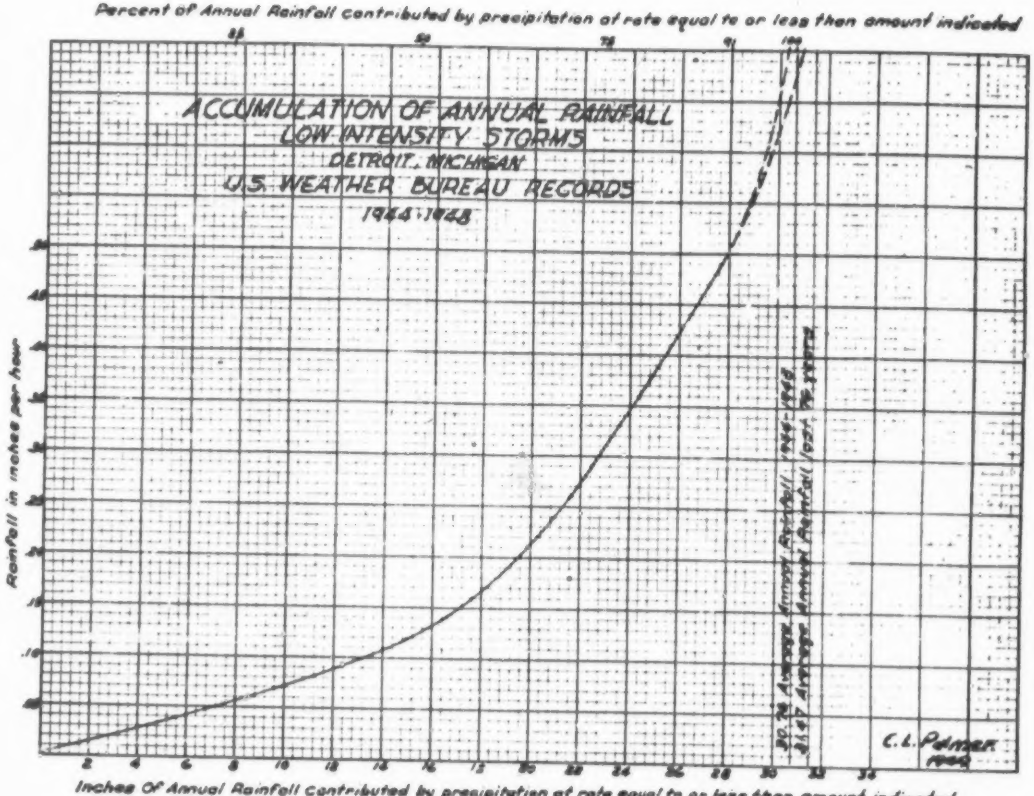

FIGURE 1.—Accumulation of annual rainfall in low intensity storms at Detroit, Mich.

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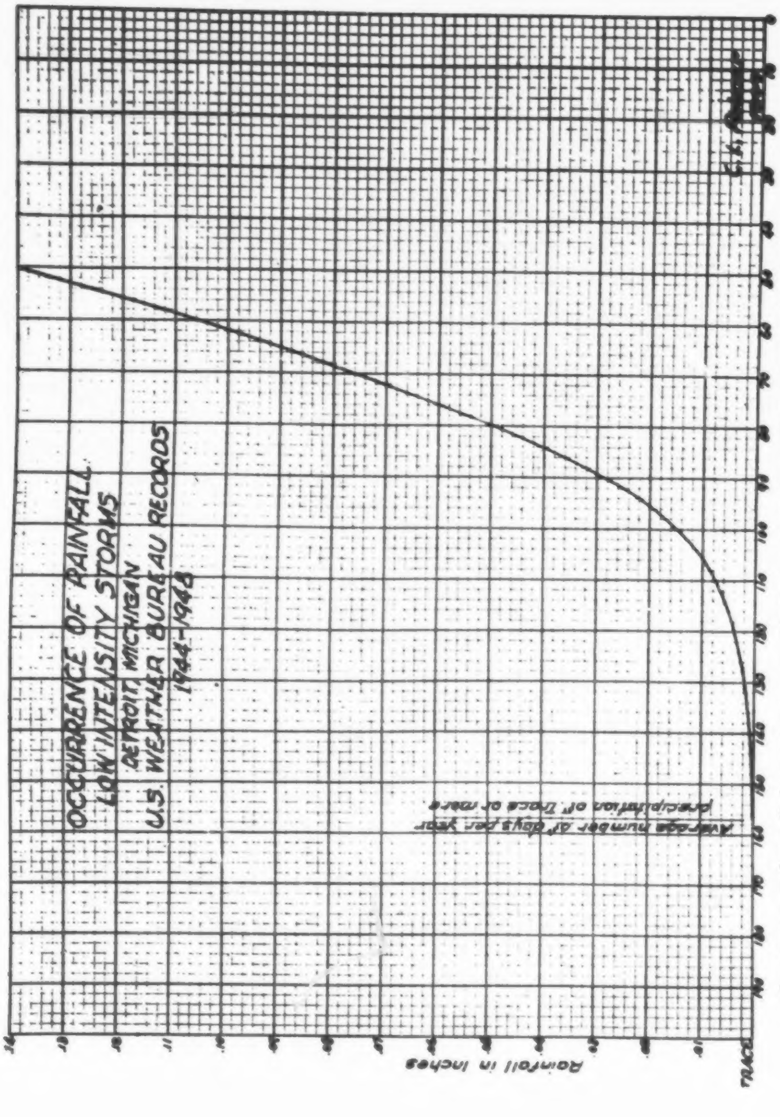

FIGURE 2.—Occurrence of rainfall in low intensity storms at Detroit, Mich.

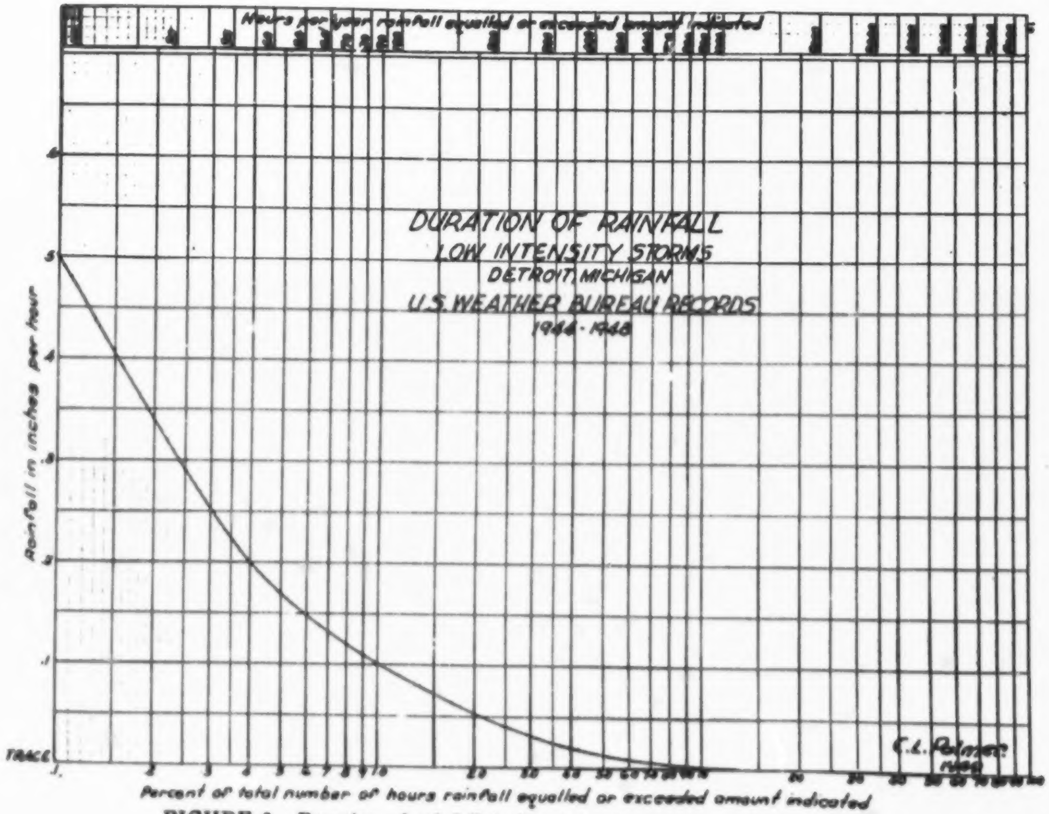

FIGURE 3.—Duration of rainfall in low intensity storms at Detroit, Mich.

ceptor system and to the treatment plant.

It is obvious that some of the very light rainfalls will not even reach the sewers. The limits of storm intensity for which this is true had to be determined in order to establish the point at which rainfall could affect the sewer system. Data on the amount of rainfall necessary to cause runoff were accumulated by field observation and measurement using portable rain gauges. The result of the observations thus made indicated that, on the average, runoff did not occur unless the precipitation exceeded 0.03 in. per hr.

Inasmuch as the analysis of conditions was to be made on the basis of quantity of flow in multiples of the average dry-weather flow, this quantity was determined from the records of the sewage treatment plant at Detroit as 162 g.p.d. per capita. This flow then had to be expressed as inches per hour on the area to evaluate it in terms equivalent to rainfall. For Detroit conditions, with 40 people per acre producing an average of 162 g.c.d., the sanitary flow is equivalent to about 0.01 in. per hr.

Reasoning from the foregoing computations, the following conclusions can be reached:

1. Before storm runoff from the land to the sewer system occurs, precipitation must exceed 0.03 in. per hr.
2. Before storm-water overflows will occur from a combined sewer system to receiving waters, the precipitation must exceed 0.03 in. per hr. plus whatever storm capacity the interception has over and above that required for sanitary flow or, in the case of Detroit, an additional 0.01 in. per hr. for each multiple of the sanitary capacity available for storm flow; for example, with an interception capacity of twice the sanitary flow, storm overflow would not occur unless the precipitation exceeded 0.04 in. per hr. (0.03 + 0.01). With an interception capacity of three times the sanitary flow, the precipitation would have to exceed 0.05 in. per hr. (0.03 + 0.02) before overflow would occur, and so on.

In order to get some check on the above method of computation, a study was made of the records of the Conner Creek storm pumping station at Detroit.

Figure 4 gives the pumping record at that station and indicates that storm flows that required pumping to the Detroit River occurred about 2.5 per cent of total time and at a pumping rate equivalent to about 0.04 in. per hr. on the tributary area. Storms producing a pumping rate less than 0.04 in. per hr. could be diverted to the interceptor system.

From the data shown in Figures 2 and 3 and the finding that no runoff will be produced by precipitation under 0.03 in. per hr. and that the average sanitary flow of 162 g.c.d. is equivalent to 0.01 in. per hr. of rainfall, computations can be made relating interceptor capacity in multiples of average sanitary flow (162 g.c.d.) to occurrence of overflows per year and duration of overflows per year.

Figure 5 shows the relation between overflow occurrence and interceptor capacity. The following points are of note:

1. With no storm-water diversion, 89 overflows per year might occur. In other words, there are on the average 89 storms when the precipitation is greater than 0.03 in.
2. With interceptor capacity 600 per cent of the average sanitary flow, 65 overflows per year might still occur to the receiving waters.
3. An interceptor with a capacity 600 per cent of the sanitary flow would reduce the number of overflow occurrences 25 per cent.
4. Relating the reduction of overflow occurrences to the capacity of the interceptor shows that each g.c.d. unit

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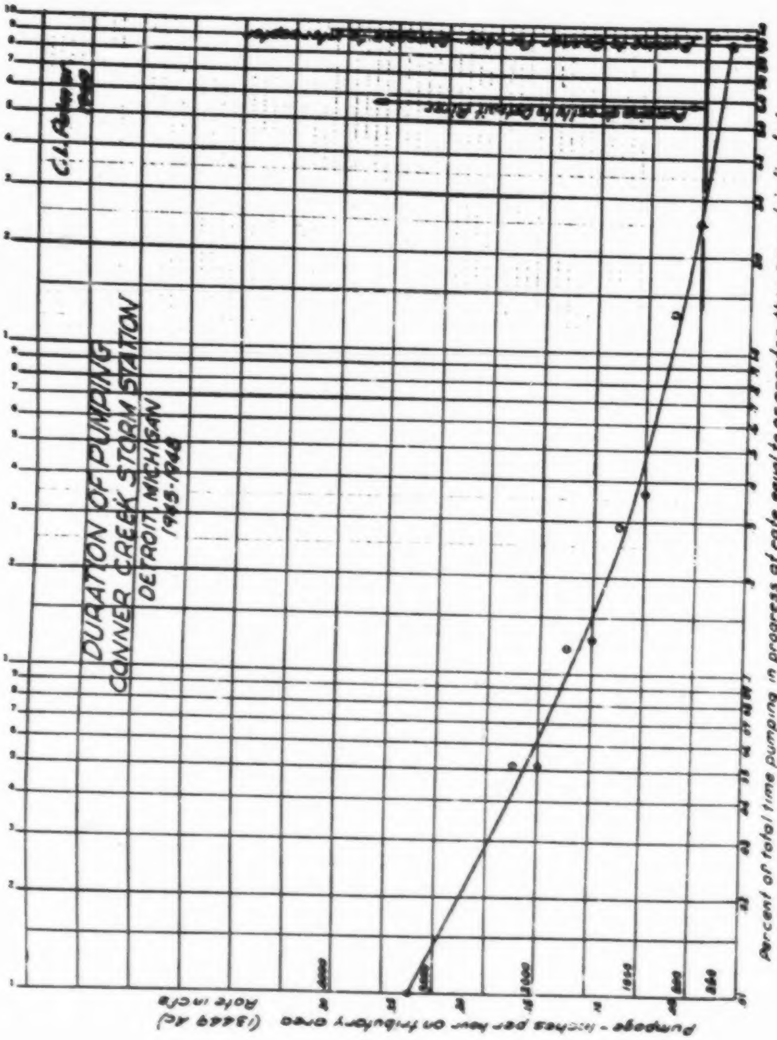

FIGURE 4.—Duration of pumping at Conner Creek storm station.

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of interceptor capacity is most effective when the interceptor capacity is 150 per cent of the sanitary flow or it may be stated that the interceptor is most effective in preventing overflow occurrence, gallon for gallon of capacity, when it has a capacity of 150 per cent of the sanitary flow.

Figure 6 shows the relation between overflow duration and interceptor capacity. The following points are of note:

1. With no storm-water diversion, the duration of storm-water overflows would occupy 3.0 per cent of total time. In other words, on the average,

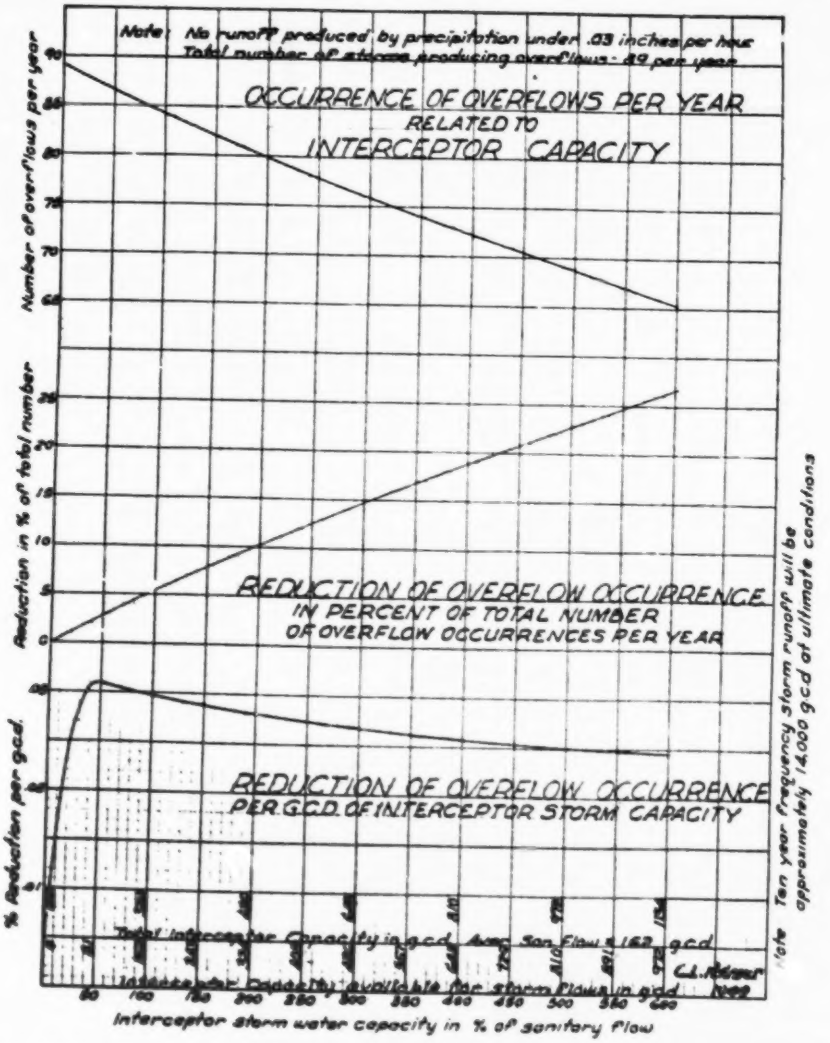

FIGURE 5.—Relation of overflow occurrence and reduction to interceptor capacity as a function of sanitary flow.

423h

precipitation in excess of 0.03 in. per hr. occurs for 3.0 per cent of total time.

2. With interceptor capacity 600 per cent of the average sanitary flow, the duration of overflow would be reduced to 1.0 per cent of total time.

3. An interceptor with a capacity 600 per cent of the sanitary flow would reduce the duration of overflows 60 per cent.

4. Relating the reduction of overflow duration to interceptor capacity shows that each g.c.d. unit of interceptor capacity is most effective when the interceptor capacity is 150 per cent

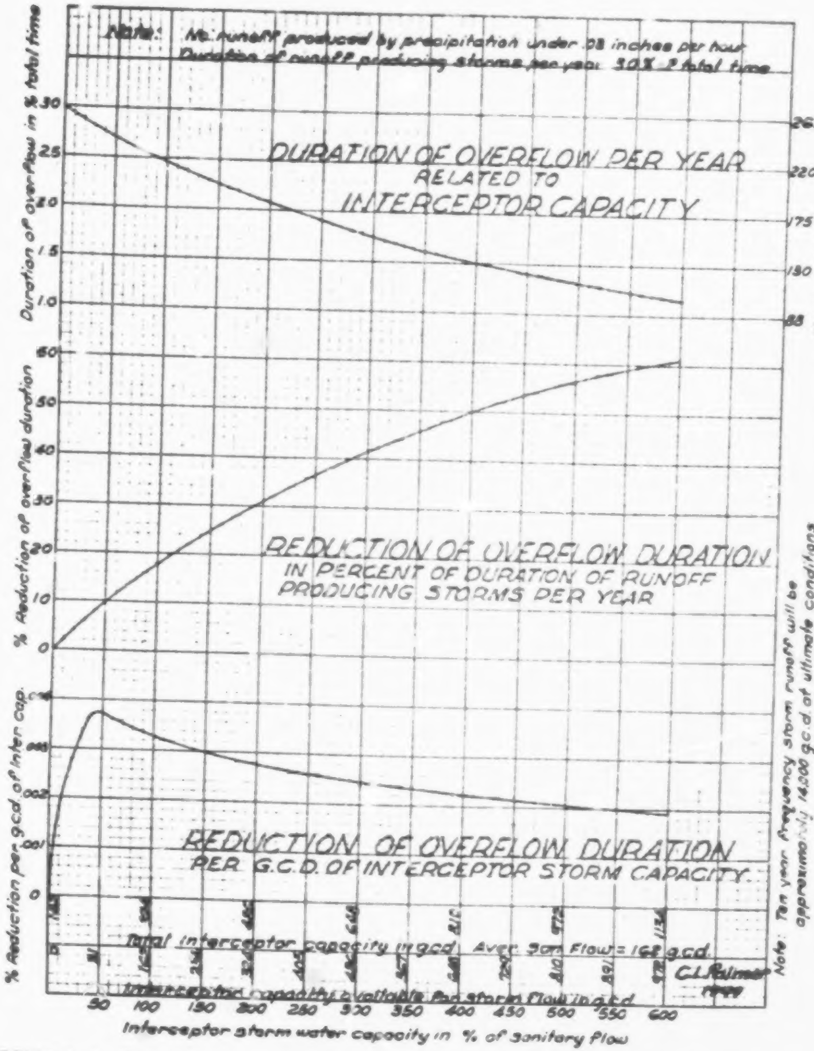

FIGURE 6.—Relation of overflow duration and reduction to interceptor capacity as a function of sanitary flow.

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of the sanitary flow (that the interceptor is most effective in reducing the duration of overflow, gallon for gallon of capacity, when it has a capacity of 150 per cent of the sanitary flow).

The foregoing analysis of the effect of storm-water diversion to interceptors as a method for abatement of the pollution resulting from storm-water overflows from a combined sewer system and summarized in Figures 5 and 6 leads to the following conclusions:

1. No satisfactory reduction in the number of storm overflow occurrences can be made by any reasonable increase in interceptor capacity.
2. No satisfactory reduction in the duration of storm overflows can be made by any reasonable increase in interceptor capacity.

## Quality of Overflow from Combined Sewers

The conclusions reached as to the effectiveness of increasing interceptor capacity in reducing storm-water overflow occurrences and duration of overflows did not consider the quality of the overflow storm water and whether the diversion of a greater number of the smaller storms and an increased portion of larger storms would accomplish the feat of preventing a disproportionately greater amount of pollution from escaping with the storm-water overflow. The conclusion reached by some observers that the quality of overflow storm water from a combined sewer shows high pollution during the early period of overflow, diminishing as the overflow continues, has not been substantiated in the studies made at Detroit.

The collection of data for Detroit has not been completed to the extent that positive conclusions have been reached, and only a limited range of storm intensities have been investigated. However, the results obtained on a large and extensive sewerage system appear to be affected by factors not so significant in simple systems, and the following conclusions have been at least partially substantiated:

1. Erratic variations in the quality of overflow storm water are characteristic and result from the time element involved in arrival at the point of overflow of the first flush water from the tributary systems discharging to the main trunk sewer. This effect appears particularly significant in an area such as Detroit, where the time of concentration in the larger sewer systems is as long as 200 min.
2. A condition of more or less uniform quality of overflow storm water cannot be expected unless the storm period substantially exceeds the time of concentration of the sewer system and in sufficient intensity to maintain high velocities.
3. After the storm flow has exceeded the capacity of the diversion to the interceptor of 2 to 2.5 times the dry weather flow, the quality of the overflow water will have about the following characteristics: Coliform indices (m.p.n.), 4,300,000; 5-day B.O.D., 50 p.p.m.; suspended solids, 250 p.p.m.; and suspended volatile solids, 100 p.p.m. Plus variations of 100 per cent and minus variations of 50 per cent are to be expected.

From the study of the quality of overflow storm water, the conclusion is reached that no satisfactory reduction in the pollution carried by storm-water overflow can be accomplished by any reasonable increase in interceptor capacity, due to the fact that diminution of pollution after the first flush does not obtain and successive peaks of pollution arrive later in the progress of the storm overflow.

## Separate Storm Sewers

The separate system of sewerage has been advanced as a solution for the problem of abatement of the pollutional effects of storm overflows from combined sewers. A study of the re-

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sults to be expected from a separate system brings up the questions of cost, results in abating pollution, and operational problems inherent in separate systems.

In an area where the topographical relief is not pronounced, the construction cost of a separate system of public sewers is estimated to be about twice the cost of a combined system, assuming new construction in an unsewered area. In an area sewered on the combined system, there would be an additional cost to individual householders, over and above the cost of the public collecting system, amounting to at least $500 each. For example, Detroit's combined sewer system to date has cost $100,000,000. If it were to be changed to a separate system, an additional $100,000,000 of public funds would have to be expended for sanitary sewers and appurtenances. In addition, the 270,000 households now connected to the combined system would have to separate their sanitary plumbing from their storm plumbing at an estimated cost of $500 each or a total of $135,000,000.

With expenditures of this magnitude indicated, overwhelming justification must be presented in support of the benefits to be accomplished by a separate system.

In studies made at Detroit to determine the quality of storm water that could be expected from a separate system, samples of storm-water runoff from the land surface were collected at points of concentration near catch basin inlets and analyzed. Although the study has not been completed and the number of samples taken and the types of areas studied are limited, it appears that the storm runoff from the land surface is polluted to the extent that the storm-water flows from a separate storm sewer could be expected to be very unsatisfactory under the same standards by which the quality of storm overflows from combined sewers are judged.

The first samples analyzed indicated such high coliform indices that doubt was cast on the type of organisms found, and, subsequently, Tryptose broth was used and B.O.D. determinations made on the samples to give better confirmation of the results. The results of a sampling taken at a catch basin in the business district of Detroit during a rain storm on March 22, 1949, are as follows:

| Sample | Time (A.M.) | M.P.N. | Total Solids (p.p.m.) | Vol. Solids (p.p.m.) | 5-Day B.O.D. (p.p.m.) |
|---|---|---|---|---|---|
| 1 | 8:55 | 930,000 | 660 | 299 | 234 |
| 2 | 9:05 | 430,000 | 715 | 331 | — |
| 3 | 9:15 | 430,000 | 726 | 340 | 124 |
| 4 | 9:30 | 930,000 | 462 | 194 | — |
| 5 | 9:45 | 430,000 | 914 | 414 | 132 |
| 6 | 10:00 | 230,000 | 430 | 202 | — |
| 7 | 11:25 | 43,000 | 714 | 370 | 96 |
| 8 | 11:32 | 25,000 | 310 | 136 | — |

Although the data collected to date may not be conclusive, the evidence indicates that more exhaustive investigation must be made before huge expenditures for separate sewer systems can be recommended.

The operational problems involved in maintaining a separate system as a separate system have not been successfully solved, particularly in large and extensive systems. Either by stealth, or ignorance, or good intention, sanitary connections improperly find their way into storm sewers where the separate system is in use. Large systems would require policing on a major scale to discover sanitary connections made surreptitiously into the storm sewers, and experience at Detroit indicates that a completely separate storm and sanitary sewer system can never be successfully protected from this type of misuse.

From a study of the results to be expected from the use of separate storm sewers, it is concluded that:

1. The cost of a separate system is prohibitive and not commensurate

with the results possible to achieve.

2. The quality of the storm water from a separate storm sewer serving an area such as Detroit would be very unsatisfactory and highly polluted.

3. Separate storm sewers are practically impossible to maintain as such without some sanitary flow being included.

### Storm-Water Treatment

The treatment of the overflow storm water from a combined sewer system has been advocated as a solution of the problem of pollution from this source. The results as to quality of the storm water after treatment that could be expected from this solution of the problem obviously would be those that could be determined in advance by design.

The results as to total over-all benefits would be effective for about 2 per cent of total time. In other words, any facility provided or expenditures made would be useful and a benefit for the duration of the pollutional effect only which would be for about 2 per cent of total time, during which time about 1 per cent of the sanitary flow escapes to the receiving waters.

Studies made at Detroit indicate that to prevent the 1 per cent of pollution entering the Detroit River from the combined sewer system would require storm-water treatment structures estimated to cost about $2,000,000 per 1,000 c.f.s. of treatment capacity, and an annual operating and maintenance cost of $60,000 per 1,000 c.f.s. of treatment capacity.

In addition to the high cost, the method has another undesirable feature in the multiplicity of treatment installations that would be required. Detroit has about 50 storm-water overflow outlets along the highly developed Detroit River waterfront, with a total capacity of about 50,000 c.f.s. The construction of storm-water treatment plants in these areas would be difficult, expensive, and objectionable. Although no conclusions have been reached, the following comparison can be made relative to storm-water treatment as a means of abating pollution resulting from storm overflows from a combined sewer system:

1. Satisfactory quality standards can be met as a matter of proper design and operation of the storm-water treatment facilities provided.

2. It appears to be the least expensive of any of the solutions presently available.

3. The main objectionable feature of this method is the multiplicity of treatment plants required, and this problem remains to be solved.

### Conclusions

The pollutional effects of storm water overflowing from a properly designed combined sewer system with diversion and regulation to an interceptor and sewage treatment system result from storm overflows that in themselves occur only about 2 per cent of total time, during which time about 1 per cent of the total sanitary sewage of the drainage area escapes into the receiving waters. It should be noted that during the 2 per cent of total time that overflow is occurring not all of the sanitary flow is escaping.

The dilutional effect of the storm-water vehicle carrying the sanitary sewage to its escape into the receiving waters has been shown to be insufficient to reduce the pollution to acceptable standards. The dilutional effect of the receiving waters in some cases may be sufficient to prevent serious local nuisance; however, the effectiveness of this process of purification is limited to those conditions where a long time factor intervenes between the point of overflow and the affected area when such uses of the receiving waters as water supply or recreation are involved. The effect of increasing the amount of diversion to interceptors is clearly shown by this study to be insignificant within the range of reasonable cost and practical size structures.

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It appears from this study of the problem that properly designed regulation and diversion of a combined sewer system will be about 99 per cent effective in preventing pollution resulting from the use of this type of sewerage system. The use of a separate sewer system may be effective in small systems and suburban areas, but the results of this study indicate that for extensive systems and densely populated areas the cost of a separate system is prohibitive and the results to be expected from such a system are entirely unsatisfactory.

It is the conclusion of this study that where conditions are critical and greater protection from pollution than that accomplished by proper diversion of sanitary flow is warranted, the most effective method appears to be storm water treatment at the individual outlets or at a common outlet for several adjacent systems.

Thank you, Mr. Chairman.

THE CHAIRMAN: Dr. Heustis.

DR. HEUSTIS: Mr. Gerald Remus, of the Detroit Water Board. Mr. Remus, your statement is a part of the written record, and unless you so desire, the remarks you make now will not be part of the written record, but it is subject to whatever you wish.

STATEMENT OF GERALD J. REMUS, GENERAL MANAGER,
BOARD OF WATER COMMISSIONERS, CITY OF DETROIT,
WATER BOARD BUILDING, 735 RANDOLPH ST.,
DETROIT 26, MICHIGAN

MR. REMUS: I have two parts that I would like to review, part of which I would like in the written record and part of which will be just a brief review of my report.

DR. HEUSTIS: Will you indicate to the reporter the parts you would like in the record?

MR. REMUS: Yes, sir.

CITY OF DETROIT
Board of Water Commissioners
Water Board Bldg. -- 735 Randolph St.
Gerald R. Remus
General Manager Detroit 26, Michigan

March 26, 1962

United States Public Health Service
and
Michigan Water Resources Commission

Gentlemen:

Herewith presented is a report on sewage and industrial waste treatment for the metropolitan Detroit area. The report establishes that:

(1) Detroit built a metropolitan sewage plant, put it in service in 1941, and by 1957 had invested $38,414,000, all without the necessity of any "court action".

(2) Detroit re-dedicated itself in 1957 toward further expanding its treatment system so that 4,000,000 people could be served in the metropolitan area. At that time, it adopted an additional plant improvement program costing $33,000,000, which is now underway. This, coupled with the work authorized by adjacent communities, makes a sum total of approximately $104,000,000 of sewage system construction now working.

(3) Detroit has a storm water and sewage collection system costing approximately $350,000,000, with at least another $90,000,000 planned. The system storage capacity is such that a considerable amount of storm flow is treated.

(4) After an areawide "one system" water supply had been developed, it followed that we wished to develop a "one-system" sewage and

drainage system. To date the area sewage system has been substantially constructed along these same lines. A program is under development sponsored by "business" and "government" so that a proper engineering system will continue to develop for the six-county area.

(5) The Detroit River has been gradually improving, and this improvement will be accelerated when the impact of $104,000,000 of construction becomes a reality. The Rouge River will show the greatest betterment in the next three months when all raw sewage will be removed.

Detroit's treatment standards have been ahead of the metropolitan area, and in accepting the extra area load for treatment, we hope to help in improvements all around. Canada should also be encouraged to add to the general improvement factor. The area communities have responded directly to their ability to "finance". Business and local government have indicated their desire to proceed in an orderly, businesslike way.

You, therefore, must judge. Do we continue in the program underway which will cooperatively develop a program for six counties on drainage, on sewage treatment standards, on sewage collection systems, on centralized administration and financing, and which will plan for systematic future development -- OR, does the U. S. Public Health Service Enforcement Bureau now start studies and when they have reached conclusions, will we find ourselves in the position whereby our opportunity to put an overall system into action will have disappeared? Two simultaneous studies cannot be justified. Therefore, the answer is obvious -- put your stamp of approval on the present programming.

Respectfully submitted,
/s/ G. Remus
General Manager

(The report is as follows:)

## DETROIT'S METROPOLITAN SEWAGE SYSTEM

By: G. Remus, General Manager
Department of Water Supply
735 Randolph Street
Detroit 26, Michigan

March 22, 1962

## DETROIT'S METROPOLITAN SEWAGE SYSTEM

Major developments of the Detroit sewage system have been and are being made, and future plans are now underway. The Sewage Treatment Plant went into service in 1940 and the cost, up to 1957, was $38,414,000. In 1957 Detroit re-dedicated itself toward doing more of the area sewage treatment job. At that time, 35 suburban communities besides Detroit had their sewage treated at this plant, or approximately 2,600,000 people. The 1957 program provided for a $33,000,000 plant expansion. Approximately $7,700,000 of this construction has been completed. Today 52 suburban communities and Detroit are under long-term contract for this treatment facility. Approximately 3,100,000 people live in the area now under contract in three counties.

All original construction and all programs committed to at this time have met the health standards of the state and local agencies. In 1961, the Lower Rouge communities signed contracts which provided for sewer interceptor construction, and the treatment will be provided at Detroit's plant. This section of work cost approximately $18,000,000. At this same time, the capacity of the Northeast Interceptor, with connections to Detroit, is being increased.

In March of 1962, contracts were signed so that twelve additional communities in southwest Wayne County would start construction for sewage facilities, costing approximately $18,000,000. The Wayne County Sewage Treatment Plant at Wyandotte will be improved. Additional areas in Wayne, Macomb and Oakland Counties are negotiating for service with the Detroit system.

While sewage treatment facilities have been and are developing, a storm water handling system developed within Detroit costing approximately $350,000,000. The size of these facilities are such that all small storms are now treated.

A great deal of work is completed or nearing completion on sewage treatment. We are also underway for an "area-wide" sewage and drainage system. The Detroit system is an area-wide operation now serving sections of three counties, with commitments to 52 communities, and with programming substantially complete for the area to serve more than 4,000,000 people by 1980. However, both drainage and sewage structures built now must serve far beyond this period of time. Therefore, it is essential that the entire six-county drainage area have a "master program" extending to at least the year 2000.

This "master program" development is underway. A committee of business, local, state and federal officials is active to guide this study. Sub-committees have been appointed; preliminary enginerring studies have been made; the area has been aerially photographed; consulting engineers have been selected; and approximately $260,000 of the $305,000 needed has been pledged by business, local and federal government. The programming project was requested by the Six-County Committee and sponsored by the National Sanitation Council. This study is progressing as expeditiously as possible without handicapping the immediate contractual developments of West Wayne County.

The work completed has made the Detroit River the cleanest of any comparable one anywhere. Records will show that fresh water fish are found throughout its entire length. The work now under construction or completed, totaling $104,000,000, will further improve river conditions. Existent operating statistics do not yet reflect this improvement. Both the Detroit Water Department and the International Joint Commission records show that the river is gradually improving, and most certainly this will continue.

It should be noted that metropolitan Detroit is developing its sewage facilities progressively without much development on the Canadian shore. It should also be noted that many who criticize standards of Detroit are only pointing their finger to other areas so that their immediate home problem does not come under surveillance. Also,many refer to Detroit in the metropolitan concept and therefore the sub-standard conditions they refer to may be as far away as Wyandotte or Estral Beach. Some minor evidence also exists to the effect that developers of a various nature, or chemical salesmen, may be doing some agitation.

The operating policy of the Detroit system is:

(1) To raise the entire area to the standard of treatment exercised in Detroit and then gradually improve the area treatment standards.

(2) To operate the Detroit Sewage Plant so that the plant effluent will always be disinfected better than the "upstream" river flow.

(3) That Detroit will continue to serve "sewage treatment" to additional areas, and that service will be provided at cost.

(4) That construction planned for the immediate future, which will show marked improvement, will be completed within the year.

(5) That a "master program" is under development for the area which will specify the type of sewerage system standards of treatment.

(6) That co-ordinated drainage facilities will be engineered and a "one system" utility will be planned for.

The orderly and rapid developments in the area should not be interfered with by additional studies or overlapping endeavors, lest confusion create a situation whereby the normal development will be set back many years.

Service for the suburban communities is provided by contracts mutually agreed upon between Detroit and the respective suburb. Agreement is reached in an orderly way for "sewage treatment". All financing is done largely by "revenue bonds". Most communities have extended themselves to the limit to pay for the facilities they must construct and also to pay for "sewage treatment". Any change of treatment standards at this time would be extremely unwise and would cause financial trouble. Some communities could not pay their bills, others would have their bond issues jeopardized because the supporting financial data would be in error, and threats of legal action by others would tie up all related bond issues -- thereby really interrupting the momentum of the develoment now underway.

The sewerage problem for the area is complex. Further sections of this report elaborate on the factors already mentioned, and we "invite" your review of this report and will supplement any portion on which you may need additional information. The remaining sections of the report are for the purpose of supporting all of the preceding statements.

Respectfully submitted,

/s/ G. Remus
General Manager

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Fish in Detroit River and Lake Erie

Exhibit 4.1 -- Bacteriological Data, Rouge River, Eight Mile Road to Detroit River

Exhibit 4.1A -- Bacteriological Data, Lower Detroit River to Lake Erie

Exhibit 4.2 - Department of Water Supply River Sampling Data to Trenton Channel

Exhibit 4.3 -- Rouge River Sampling Data, Department of Water Supply and I.J.C.

Exhibit 4.4 -- Detroit News Report, March 3, 1962 Record Catches of Perch in W. Lake Erie

Exhibit 4.5 -- I.J.C. Data for Detroit River

Exhibit 4.6 -- Aerial Photo, Junction of Rouge and Detroit Rivers

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B. Excerpts from Michigan Department of Health and Michigan Water Resources Commission Report - "Some Significant Accomplishments and Trends in Pollution Control in the Greater Detroit Metropolitan Area" - January 8, 1962

C. Michigan Department of Health Approval of Detroit Sewage Disposal System, Enlargement and Improvement Program, July 27, 1957

Exhibit 4.7 - Minutes of Meetings with and Letter from Michigan Department of Health

D. Facilities Under Construction in the Area to Abate Pollution

Exhibit 4.8 - List and Costs of Facilities

Exhibit 4.9 - Rouge Valley Sewage Disposal System

Exhibit 4.10 - Down River Sewage Disposal System

Exhibit 4.11 - Northeast Interceptor District

E. Dequindre Interceptor to Detroit and Twelve Towns Drains

Cost of Facilities

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B. Water Main Construction Precedent

C. National Sanitation Foundation - Sanitation Council for Southeastern Michigan, Six County Sewerage and Drainage Study History, Water Study Completed, Sewerage and Drainage Study, Budget, Engineering Consultants, Scope of Job, Including Cost Estimates

Exhibit 5.1 - Financial Support, Six-County Sewerage and Drainage Study

Exhibit 5.2 - List of Industrial Contributors

Exhibit 5.3 - U.S. Public Health Service Grant

6 United States Public Health Service Study vs. National Sanitation Foundation - Sanitation Council for Southeastern Michigan Study 456

Reasons for Preference of Sanitation Council Study- Study Underway, More Inclusive, More Constructive, Two Studies Not Realistic, Technical Standards Should not be Changed, Canadian Situation

## SECTION 1

## DETROIT'S INITIAL SEWAGE SYSTEM
## 1940 - 1957

A. The Detroit Sewage Disposal System was placed in service in 1940.

B. Map of Area Served in 1957 -- See Exhibit 1.1 (Attached)

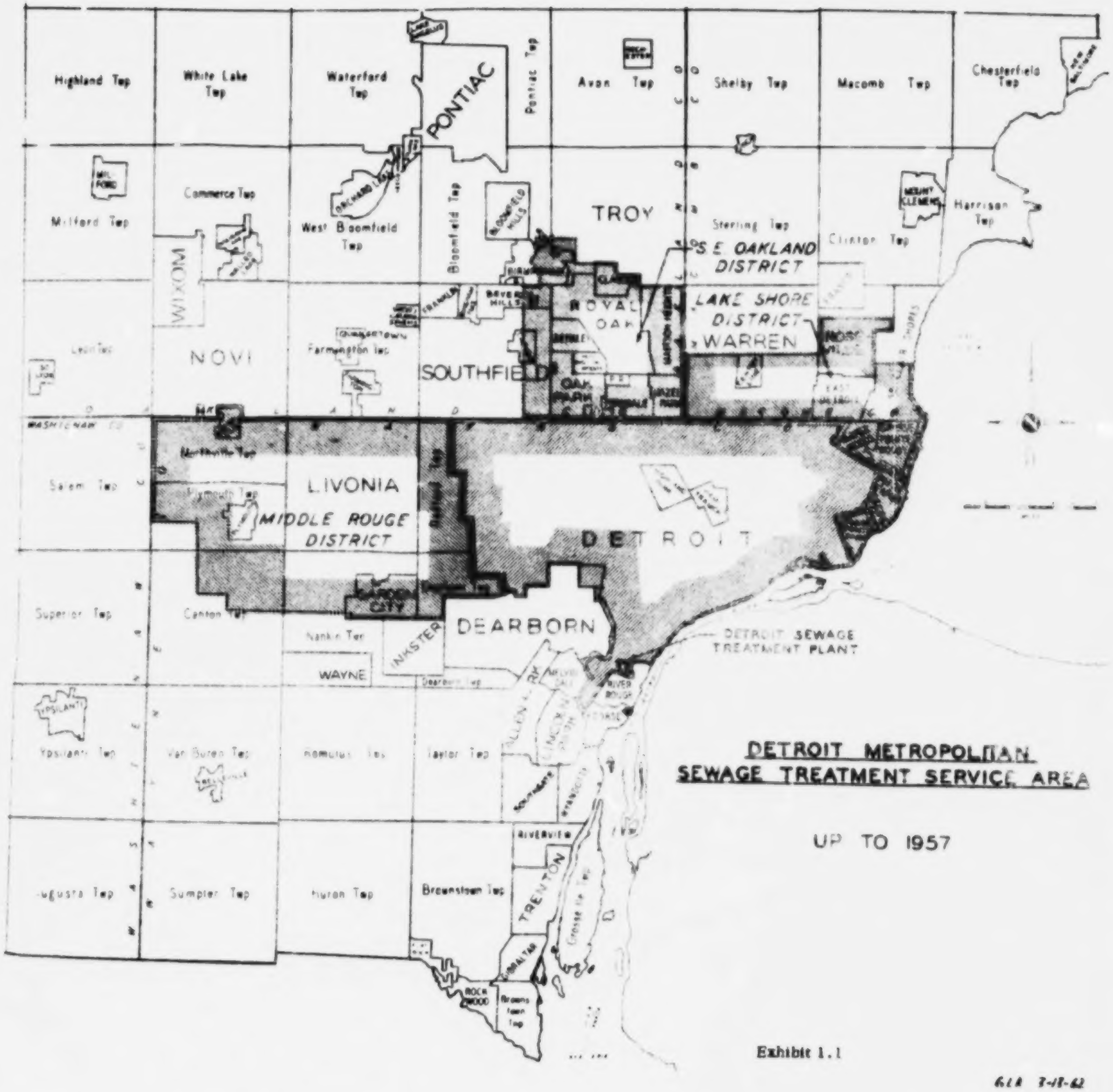
C. Sewage Treatment Plant Layout in 1957 -- See Exhibit 1.2 (Attached)

| | | |
|---|---|---|
| D. Total Cost of Plant, Interceptors, Regulators and Sanitary Pumping Stations in 1940 | -- | $27,379,000 |
| E. To July, 1957, Additions and Improvements to the Above | -- | $11,035,000 |
| | Total: | $38,414,000 |

F. Primary Sedimentation - Chlorination of Plant Effluent Eighty-five percent of the settleable solids are removed and incinerated.

G. 2,605,000 people served - This includes 660,000 in 35 adjacent communities

(The Exhibits to Section 1 are as follows:)


Highland Twp
White Lake Twp
Waterford Twp
PONTIAC
Pontiac Twp
Avon Twp
Shelby Twp
Macomb Twp
Chesterfield Twp
Milford Twp
Commerce Twp
West Bloomfield Twp
Bloomfield Twp
BLOOMFIELD HILLS
TROY
Sterling Twp
Clinton Twp
MOUNT CLEMENS
Harrison Twp
S E OAKLAND DISTRICT
LAKE SHORE DISTRICT
WARREN
ROYAL OAK
BEVERLY HILLS
WIXOM
NOVI
Lyon Twp
Farmington Twp
SOUTHFIELD
OAK PARK
WASHTENAW CO
Northville Twp
Salem Twp
LIVONIA
Plymouth Twp
MIDDLE ROUGE DISTRICT
DETROIT
GARDEN CITY
Superior Twp
Canton Twp
Nankin Twp
DEARBORN
INKSTER
WAYNE
Dearborn Twp
RIVER ROUGE
YPSILANTI
Ypsilanti Twp
Van Buren Twp
Romulus Twp
Taylor Twp
ALLEN PARK
LINCOLN PARK
SOUTHGATE
WYANDOTTE
RIVERVIEW
Augusta Twp
Sumpter Twp
Huron Twp
Brownstown Twp
TRENTON
Grosse Ile Twp
GIBRALTAR
ROCKWOOD
Brownstown Twp
DETROIT SEWAGE TREATMENT PLANT

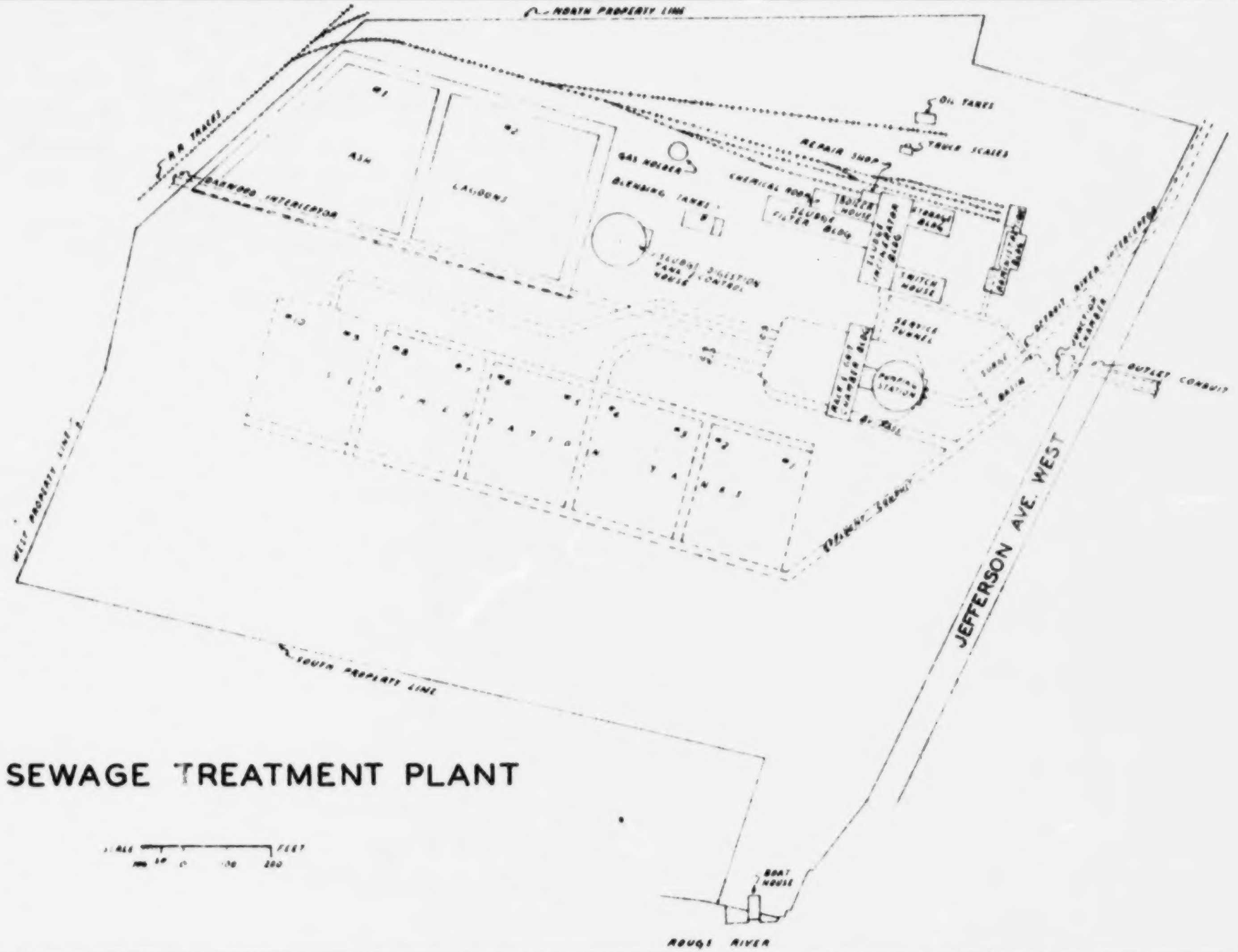
## DETROIT METROPOLITAN SEWAGE TREATMENT SERVICE AREA

UP TO 1957

Exhibit 1.1

GLA 7-18-62

437v


NORTH PROPERTY LINE
R.R. TRACKS
OAKWOOD INTERCEPTOR
#1
ASH
#2
LAGOONS
GAS HOLDER
BLENDING TANKS
SLUDGE DIGESTION TANK / CONTROL HOUSE
CHEMICAL ROOM
SLUDGE FILTER BLDG.
REPAIR SHOP
OIL TANKS
TRUCK SCALES
BOILER HOUSE
SLUDGE INCINERATOR BLDG.
STORAGE BLDG.
SWITCH HOUSE
ADMINISTRATION BLDG.
SERVICE TUNNEL
RACK & GRIT CHAMBER BLDG.
PUMPING STATION
BY PASS
SURGE BASIN
DETROIT RIVER INTERCEPTOR
JUNCTION CHAMBER
OUTLET CONDUIT
#10
#9
#8
#7
#6
#5
#4
#3
#2
#1
SEDIMENTATION TANKS
OUTLET CONDUIT
JEFFERSON AVE. WEST
WEST PROPERTY LINE
SOUTH PROPERTY LINE
BOAT HOUSE
ROUGE RIVER
SCALE
FEET
100
0
100
200

# SEWAGE TREATMENT PLANT

| | | | | | |
|---|---|---|---|---|---|
| | DESIGNED BY<br>DRAWN BY<br>TRACED BY<br>CHECKED BY | | UP TO 1957 | CITY OF DETROIT<br>DEPARTMENT OF WATER SUPPLY<br>DIVISION OF ENGINEERING | B-1000 |

Exhibit 1.2

437C

Exhibit 2.4

# DETROIT SEWAGE DISPOSAL SYSTEM
# ENLARGEMENT AND IMPROVEMENT PROGRAM

JULY 22, 1957

4372

# DETROIT SEWAGE DISPOSAL SYSTEM
# ENLARGEMENT AND IMPROVEMENT PROGRAM

The Sewage Treatment Plant and the sewerage interceptor system now require additions and improvements to provide:

(a) Proper facilities to handle the continually increasing sewage and ground garbage load.

(b) Proper facilities to control the excessive fly ash now being discharged into the atmosphere. The City is under notice that it is violating the law on this matter.

(c) Improved treatment methods. As the plant is called upon to handle more and more solids, better methods of treatment are needed to remove a greater percentage of solids from the sewage, thus lessening the amount going to the river.

(d) Added reliability and proper capacity to the interceptor system. Work has been deferred on this item for some time due to lack of funds.

At the same time these steps are being taken, it is recommended that certain additional areas be connected to the system, namely: Dearborn, West Wayne County, and Southeastern Oakland County (Shown on Exhibit 1, Appendix - Proposed Service Area Map). This area addition will broaden the revenue base and make greater use of the plant's designed capacities.

## Historical

The Detroit Sewage disposal system was placed in service in 1940, and the total cost was $27,379,000 including plant and interceptor. Up to 1956 additions and improvements were added costing about $4,000,000. In 1956 further improvements were made costing $6,500,000. The present indebtedness amounts to $7,220,000 in the form of revenue bonds.

The sewage disposal system serves Detroit and 34 adjacent communities. Exhibit 2, Appendix, identifies the communities that are now served. A total of 2,667,000 people are now being served; 1,909,000 of these are in Detroit and 758,000 in the suburbs.

## Garbage

The ground garbage load is heavy and increasing continuously because of the expanding use of domestic and commercial garbage grinders.

Some suburban areas have practically 100 per cent domestic garbage ground disposal service and the use of these units in Detroit is increasing rapidly.

The original design of the Sewage Treatment Plant did not provide for garbage disposal. This program provides the service of domestic and commercial ground garbage disposal for all the area. Curves shown on Exhibit 3, Appendix, illustrate the importance of the pertinent factors involved, such as sewage flow, sewage solids and garbage, and what effect the years will have.

437a

## Fly Ash

The Board of Water Commissioners are and have been under notice for some time that the present operations of the Sewage Treatment Plant are in violation of the law because excessive fly ash is ejected to the atmosphere as the result of our sewage solids burning operations at 9300 West Jefferson. Fly ash is spread throughout the neighborhood resulting in many complaints. Improved combustion equipment with proper appurtenances must be constructed to correct this condition.

## Improved Treatment

The sewage treatment load has gradually increased. The increase is now accelerated for a variety of reasons. Principal factors are addition of ground garbage, increased per capita use of water and more industrial wastes. This means the transportation of more and more tons of waste through the sewerage system to the treatment plant. An improved treatment method must be considered, under any conditions, to reduce the tonnage of wastes discharged to the Detroit River. Chemical precipitation is the method most compatible with a comparatively moderate capital expenditure, but it entails a much higher operating cost.

## Schedule

To properly handle the sewage-garbage load, additional settling basins, filters, incinerators, treatment facilities, and interceptor improvements, with appropriate housing enclosures, have to be constructed.

A schedule of construction with estimated costs,by years, follows:

### 1958-61

#### Plant Additions

Four more sedimentation tanks.
Enlarged effluent collecting channel.
Overflow channel to Rouge River.
Second filter building.
Ten more vacuum filters.
Building for incinerating kiln.
One incinerating kiln.
Fly ash collecting equipment for this kiln.

#### Interceptor Additions and Improvements

Second siphon at Fort and Bayside.
Evergreen section of west interceptor - Ford Road to Warren.
Regulator and diversion works at West McNichols and Rouge River.
Control gates on Conner Creek outlet.
Alteration of Conner Creek intake well as a sanitary pumping station.

Total - $20,000,000.

**1961-65**

**Plant Additions**

Second filter building.
Six more vacuum filters.
Second incinerating kiln.
Fly ash collecting equipment for this kiln.

**Interceptor Additions**

Additional regulation and diversion works on master plan - relief outlet.

Total - $ 5,7[illegible]7,000.

**1965-75**

**Plant Additions**

Three more sedimentation tanks.
Four more vacuum filters.
Set up dismantled incinerator.
Install improved treatment process. (Estimate based on chemical precipitation process.)

**Interceptor Additions**

Additional regulation and diversion works on master plan - relief outlets.

Total - $ 7,027,000.

Grand Total - $32,794,000.

Construction costs based on E.N.R. index of 808 for Detroit.

Recommendations are:

That the above schedule be adopted and that we be authorized at this time to spend $20,000,000, and that money be spent as required to carry out the program as scheduled. Three million dollars have accumulated towards this program. The remaining seventeen million dollars will be financed by the issuance of revenue bonds, to be issued as needed.

Increased operating costs and debt service result because of the improvement to provide better service. Many localities are already receiving considerable garbage disposal service, which is not included in the present sewage rate. To provide for this extra service and to adjust for these inequalities, a rate adjustment is recommended of 10 cents per 1000 cubic feet on the basis of water used.

4379

The program is designed to provide Sewage Treatment facilities for 4 million people by 1980; approximately 2 million in Detroit and 2 million in the adjacent suburban areas.

The average Detroit family uses approximately 3000 cubic feet of water every three months; therefore, the proposed increase of 10 cents per 1000 cubic feet would add 30 cents to that family's quarterly water bill.

Present Rate--Total Water and Sewage--Per 1000 cu. ft.

| | | Detroit* | Suburban* Municipalities | Suburban* Individual |
|---|---|---|---|---|
| First | 10,000 cu.ft. per month | $1.05 | $1.19½ | $1.23 |
| Next | 90,000 cu.ft. per month | .87 | 1.00½ | 1.04 |
| All over | 100,000 cu.ft. per month | .75 | .87½ | .91 |

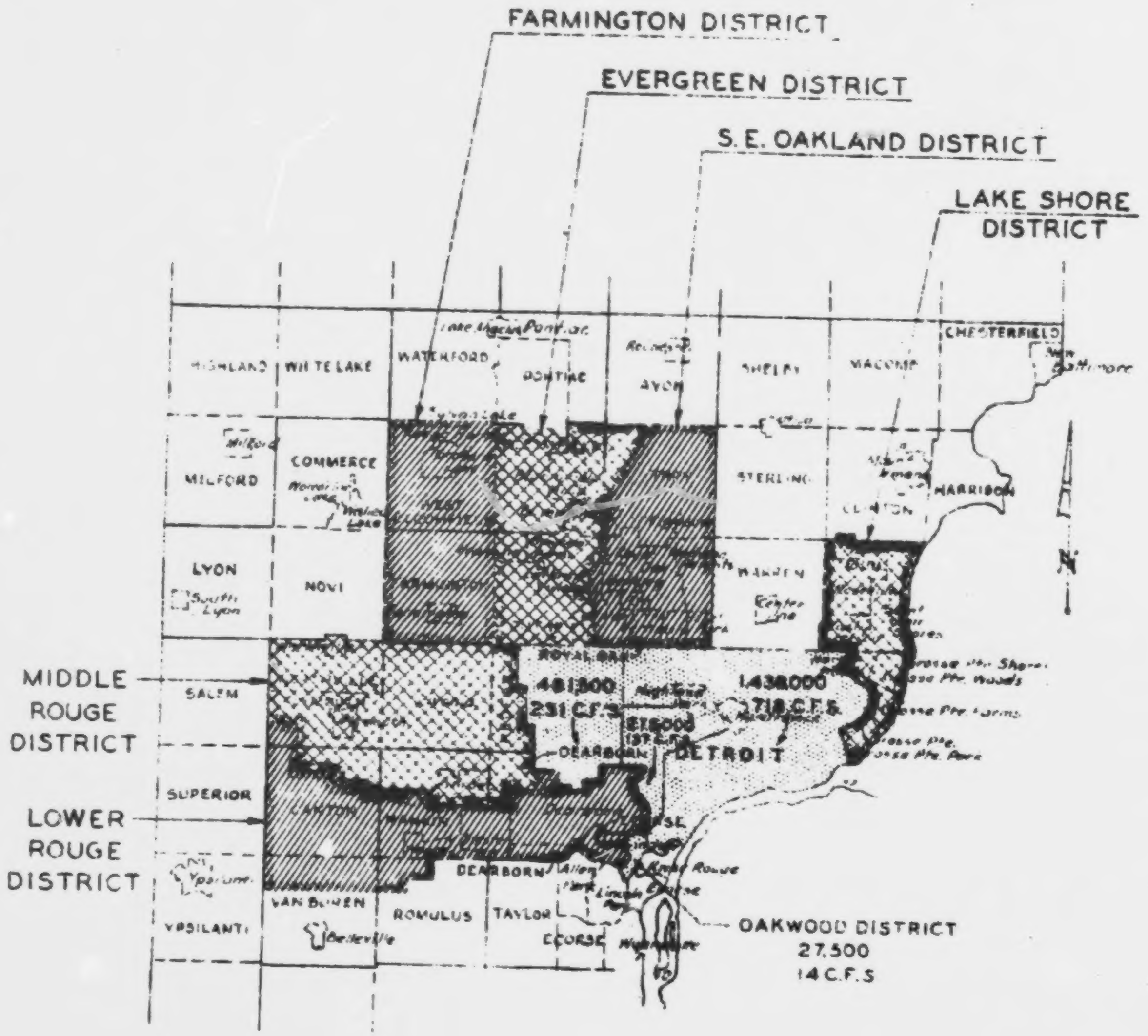
Proposed Rate--Total Water and Sewage--Per 1000 cu. ft.

| | | | | |
|---|---|---|---|---|
| First | 10,000 cu.ft. per month | $1.15 | $1.29½ | $1.33 |
| Next | 90,000 cu.ft. per month | .97 | 1.10½ | 1.14 |
| All over | 100,000 cu.ft. per month | .85 | .97½ | 1.01 |

*Plus service charge.

Exhibit 4 shows the general plan of additions as they will be made at the Sewage Treatment Plant and how the improvements will cover the area now owned by the Department.

G. Remus/J
7-22-57


FARMINGTON DISTRICT
EVERGREEN DISTRICT
S. E. OAKLAND DISTRICT
LAKE SHORE DISTRICT
HIGHLAND
WHITE LAKE
WATERFORD
Pontiac
PONTIAC
AVON
SHELBY
MACOMB
CHESTERFIELD
New Baltimore
Milford
MILFORD
COMMERCE
STERLING
CLINTON
HARRISON
LYON
South Lyon
NOVI
WARREN
Center Line
N
MIDDLE ROUGE DISTRICT
SALEM
ROYAL OAK
481,300
231 C.F.S.
1,438,000
718 C.F.S.
276,000
137 C.F.S.
DEARBORN
DETROIT
Grosse Pte. Shores
Grosse Pte. Woods
Grosse Pte. Farms
Grosse Pte.
Grosse Pte. Park
SUPERIOR
LOWER ROUGE DISTRICT
CANTON
DEARBORN
Allen Park
Lincoln Park
River Rouge
Ecorse
Ypsilanti
YPSILANTI
VAN BUREN
Belleville
ROMULUS
TAYLOR
ECORSE
Wyandotte
OAKWOOD DISTRICT
27,500
14 C.F.S

# PROPOSED SERVICE AREA
# DETROIT SEWAGE TREATMENT PLANT

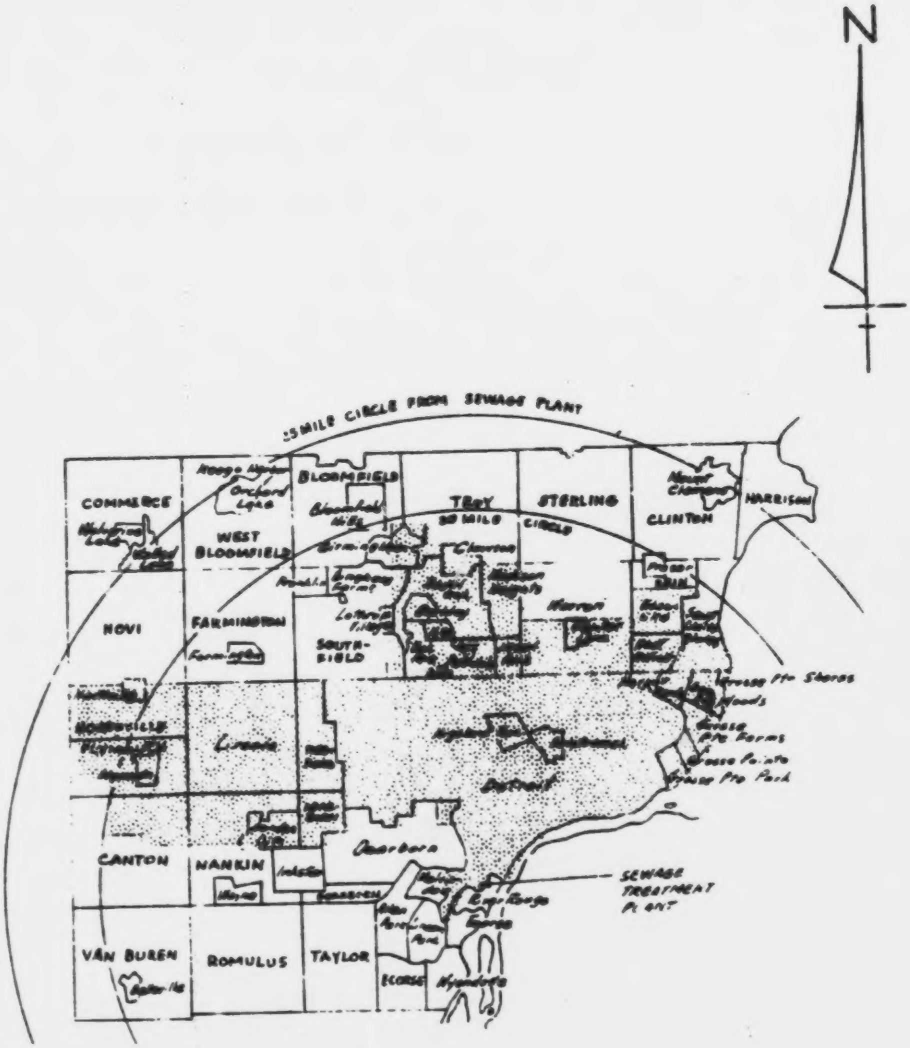
1980 POPULATION 4,084,000

1956

*Revised 4-17-57*

**EXHIBIT 1**

431l


N
25 MILE CIRCLE FROM SEWAGE PLANT
20 MILE CIRCLE
COMMERCE
WEST BLOOMFIELD
BLOOMFIELD
TROY
STERLING
CLINTON
HARRISON
Mount Clemens
Orchard Lake
Bloomfield Hills
Birmingham
Franklin
Lathrup Village
Clawson
Madison Heights
Warren
NOVI
FARMINGTON
Farmington
SOUTH-FIELD
Livonia
Detroit
Dearborn
Inkster
Wayne
Grosse Pte Shores
Woods
Grosse Pte Farms
Grosse Pointe
Grosse Pte Park
SEWAGE TREATMENT PLANT
River Rouge
CANTON
NANKIN
VAN BUREN
Belleville
ROMULUS
TAYLOR
ECORSE
Wyandotte

## PRESENT SERVICE AREA
## DETROIT SEWAGE TREATMENT PLANT

1957 POPULATION 2,605,000

**EXHIBIT 2**

431j

*CITY OF DETROIT* DEPARTMENT OF WATER SUPPLY *DIVISION OF ENGINEERING*

## SEWAGE TREATMENT PLANT - ENLARGEMENT PROGRAM
## POPULATION SERVED
## PAST, PRESENT AND ESTIMATED FUTURE

*SHEET NO.* 1 OF 5

*COMPUTED BY* V. ANDERSON *DRAWN BY* M.S.Y. *DATE* JUNE 7, 1957

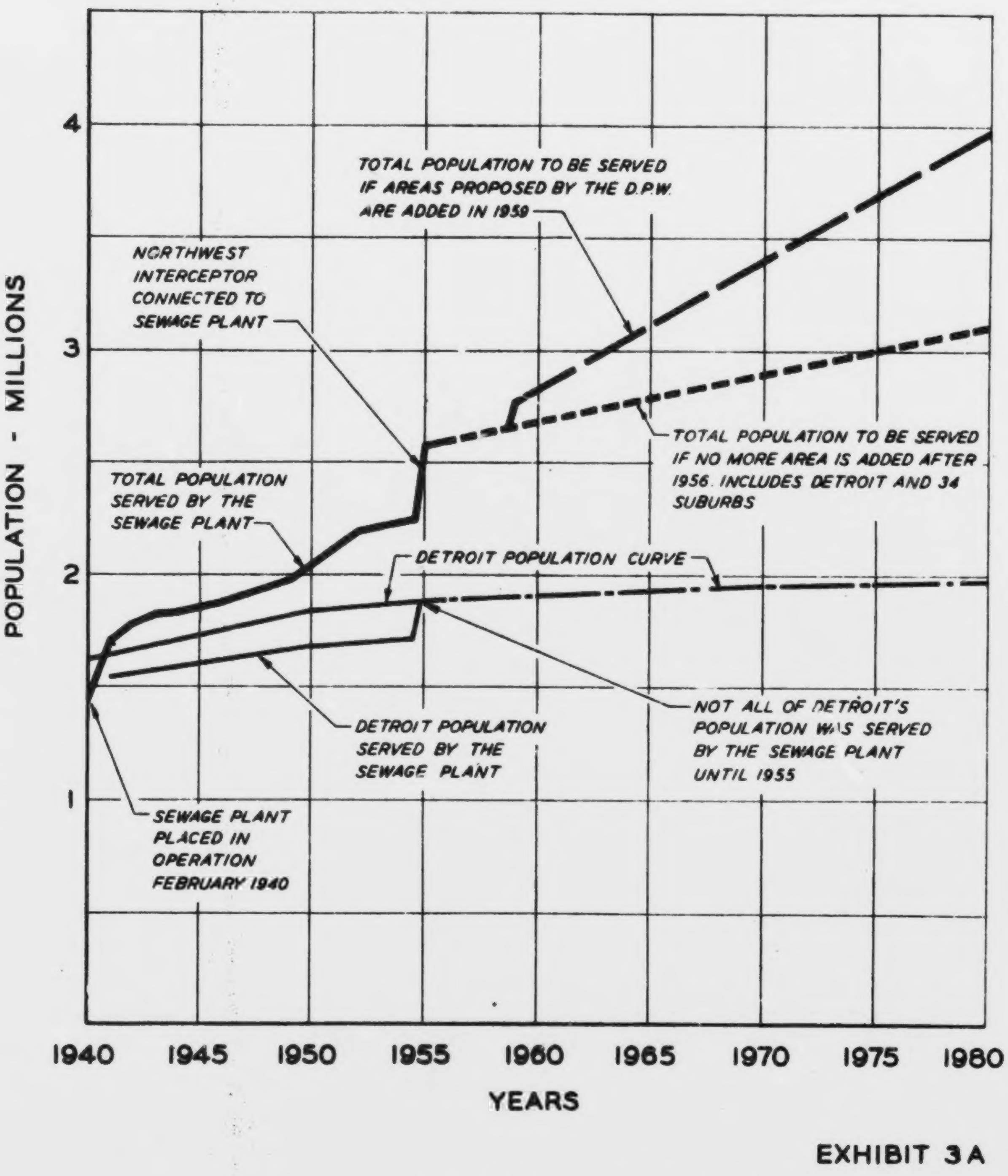


EXHIBIT 3A

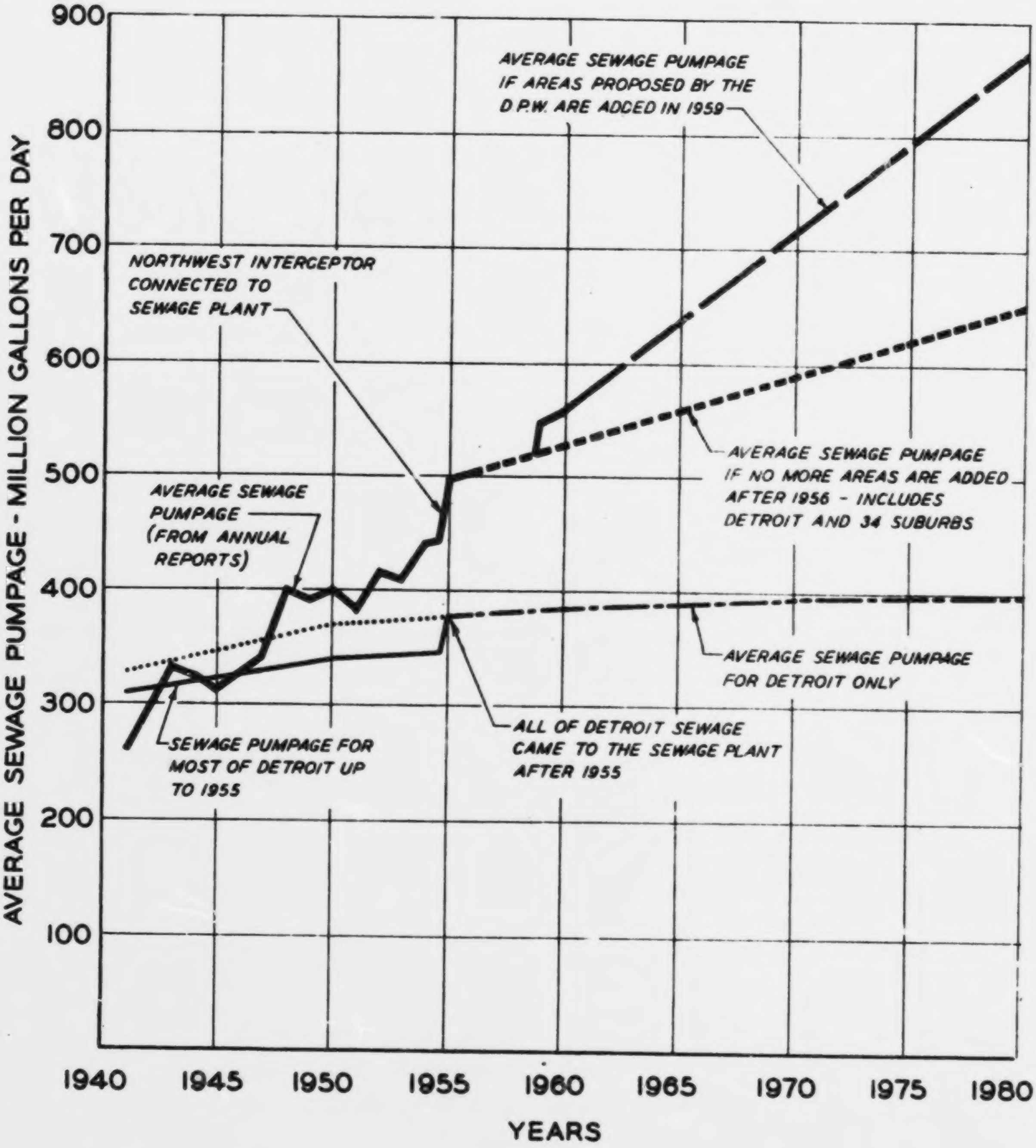
437k

*CITY OF DETROIT* **DEPARTMENT OF WATER SUPPLY** *DIVISION OF ENGINEERING*

# SEWAGE TREATMENT PLANT - ENLARGEMENT PROGRAM
## SEWAGE PUMPAGE
## PAST, PRESENT AND ESTIMATED FUTURE

*SHEET NO* 2 OF 5

*COMPUTED BY* V. ANDERSON *DRAWN BY* M.S.Y. *DATE* JUNE 7,1957



GPO 820819-9-20

EXHIBIT 3B

437l

*CITY OF DETROIT* **DEPARTMENT OF WATER SUPPLY** *DIVISION OF ENGINEERING*

# SEWAGE TREATMENT PLANT - ENLARGEMENT PROGRAM
# SUSPENDED SOLIDS REMOVED IN SEDIMENTATION TANKS
# PAST, PRESENT AND ESTIMATED FUTURE

*SHEET NO.* 3 OF 5

*COMPUTED BY* V. ANDERSON *DRAWN BY* M.S.Y. *DATE* JUNE 10,1957

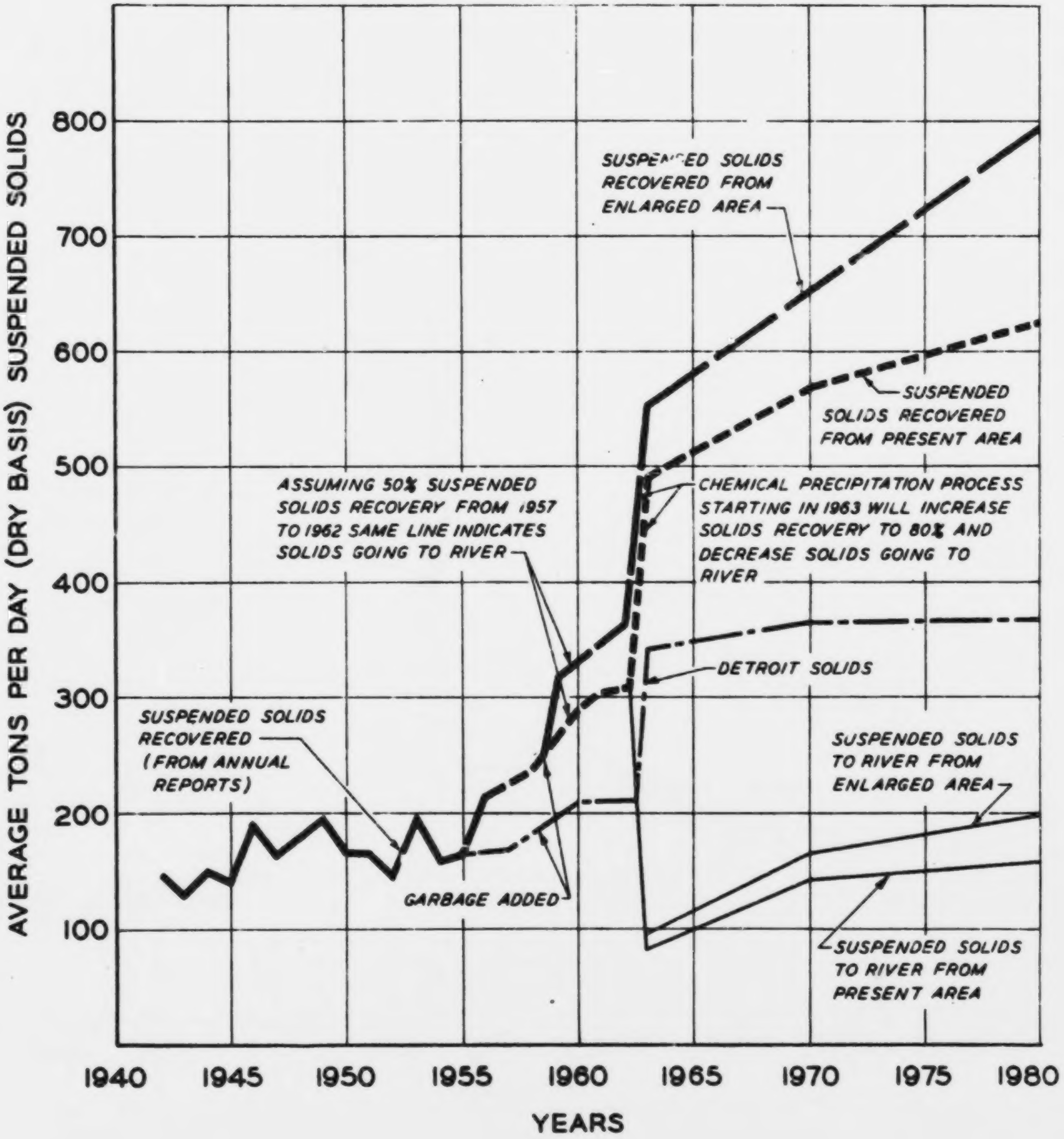


EXHIBIT 3C

437m

*CITY OF DETROIT* **DEPARTMENT OF WATER SUPPLY** *DIVISION OF ENGINEERING*

# SEWAGE TREATMENT PLANT - ENLARGEMENT PROGRAM
## SOLIDS INCINERATED
## PAST, PRESENT AND ESTIMATED FUTURE

*SHEET NO.* 4 OF 5

*COMPUTED BY* V. ANDERSON *DRAWN BY* M.S.Y. *DATE* JUNE 7, 1957

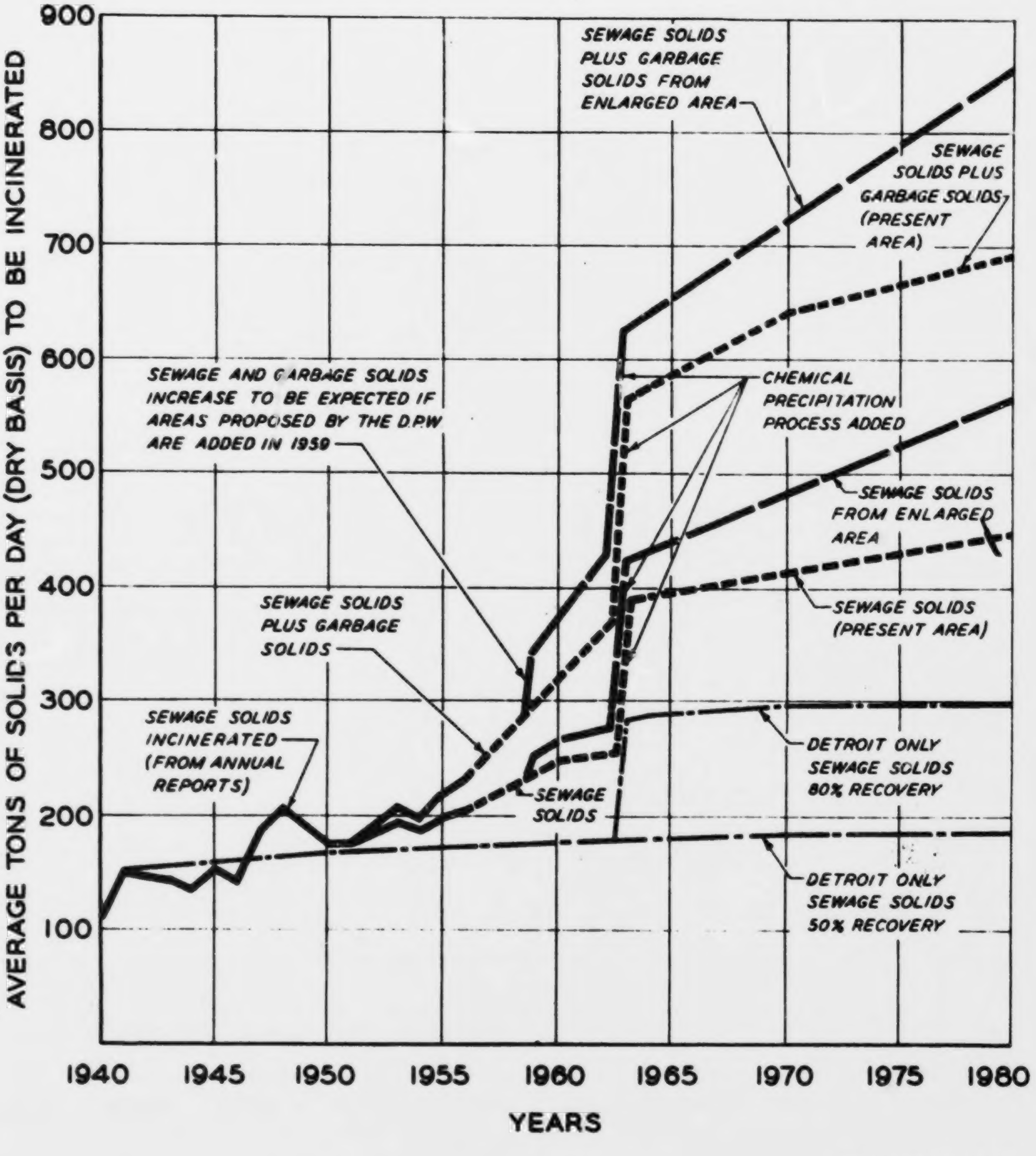


EXHIBIT 3 D

437N

*CITY OF DETROIT* **DEPARTMENT OF WATER SUPPLY** *DIVISION OF ENGINEERING*

# SEWAGE TREATMENT PLANT - ENLARGEMENT PROGRAM
## TOTAL SOLIDS - ENTERING & LEAVING SEDIMENTATION TANKS
## PAST, PRESENT AND ESTIMATED FUTURE

*SHEET NO.* 5 OF 5

*COMPUTED BY* V. ANDERSON *DRAWN BY* M.S.Y. *DATE* JUNE 7, 1957

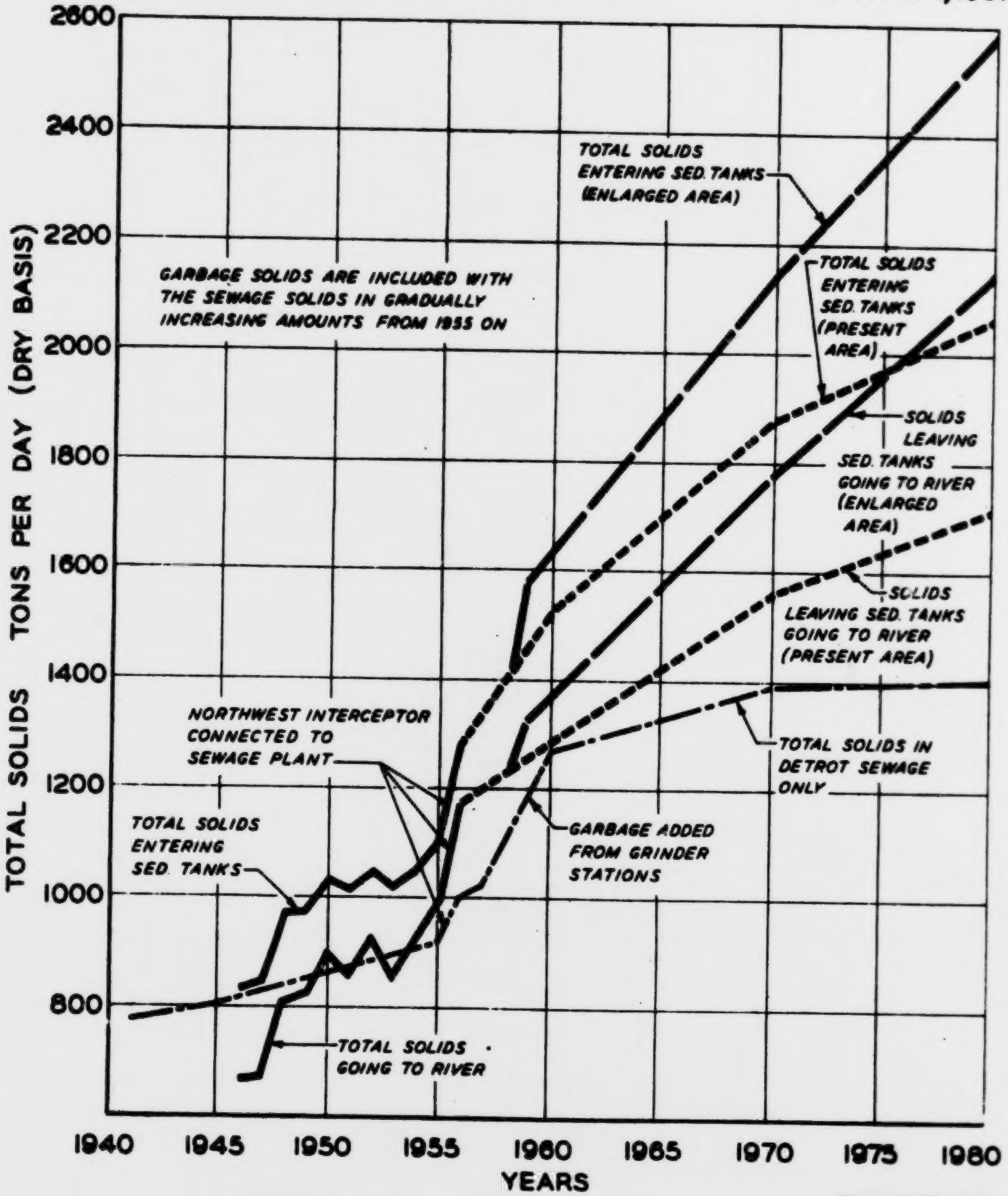
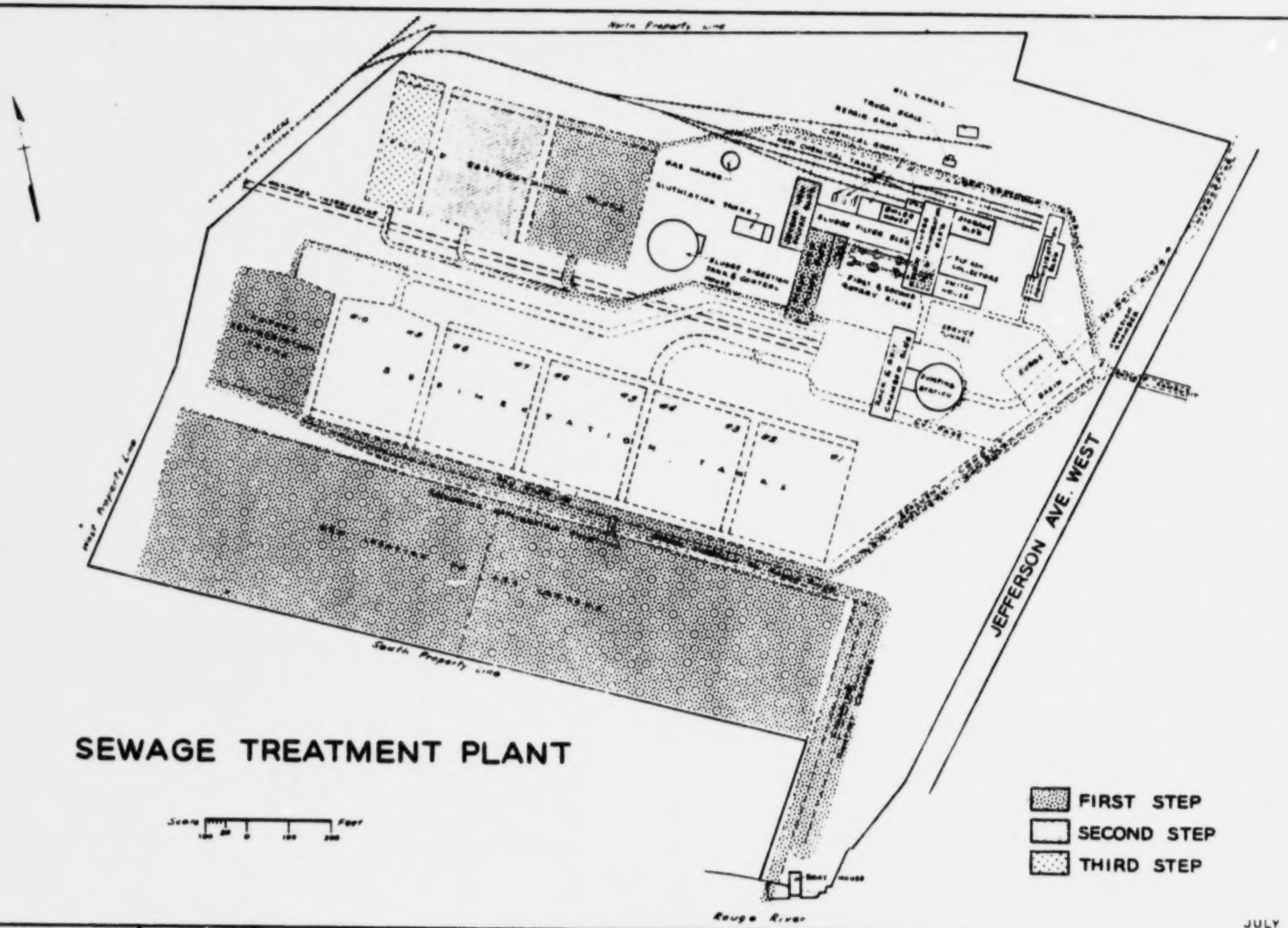


EXHIBIT 3E

4310


North Property Line
West Property Line
South Property Line
Rouge River
JEFFERSON AVE. WEST
OIL TANKS
TRUCK SCALE
REPAIR SHOP
CHEMICAL ROOM
NEW CHEMICAL TANKS
GAS HOLDER
ELUTRIATION TANKS
SLUDGE DIGESTION TANKS & CONTROL HOUSE
SLUDGE FILTER BLDG.
BOILER HOUSE
STORAGE BLDG.
DUST COLLECTORS
SWITCH HOUSE
FIRST & SECOND ROTARY KILNS
SERVICE TUNNEL
PUMPING STATION
RACK & GRIT CHAMBER BLDG.
SURGE BASIN
BOAT HOUSE
SEDIMENTATION TANKS
#1
#2
#3
#4
#5
#6
#7
#8
#9
#10
Scale
100
50
0
100
200
Feet
FIRST STEP
SECOND STEP
THIRD STEP

## SEWAGE TREATMENT PLANT

JULY 1957

|  |  |  |
|---|---|---|
| DESIGNED BY | P. Anderson |  |
| DRAWN BY |  |  |
| TRACED BY | M.S.Y. |  |
| CHECKED BY | P. Anderson |  |

ENLARGEMENT PROGRAM
GENERAL PLAN SHOWING
ADDITIONS IN THREE STEPS

CITY OF DETROIT
DEPARTMENT OF WATER SUPPLY
DIVISION OF ENGINEERING

B-1000

EXHIBIT 4

SECTION 2

## DETROIT'S SEWAGE SYSTEM
## 1957 to Present

A. Map of Area Served in 1962 -- (See Exhibit 2.1)

B. Sewage Treatment Plant Layout in 1962 --

(See Exhibit 2.2)

C. Cost of Additions from 1957 to Present

| | |
|---|---|
| 1. Sewage Treatment Plant -- | $ 4,229,069 |
| 2. Interceptors, Regulators and Sanitary Pumping Stations, Detroit | $ 3,465,109 |
| Total: | $ 7,694,176 |
| 3. Interceptors and Sanitary Pumping Stations -- Suburbs -- | $30,518,128 |

(See Exhibit 2.3)

| | |
|---|---|
| Federal funds received -- 1940 to date-- | $10,203,750 |

D. Population Served:

Approximately 3,100,000 in Detroit, including 1,400,000 in 47 suburban communities. Five more will be added within the next year. The suburban population served increased 740,000.

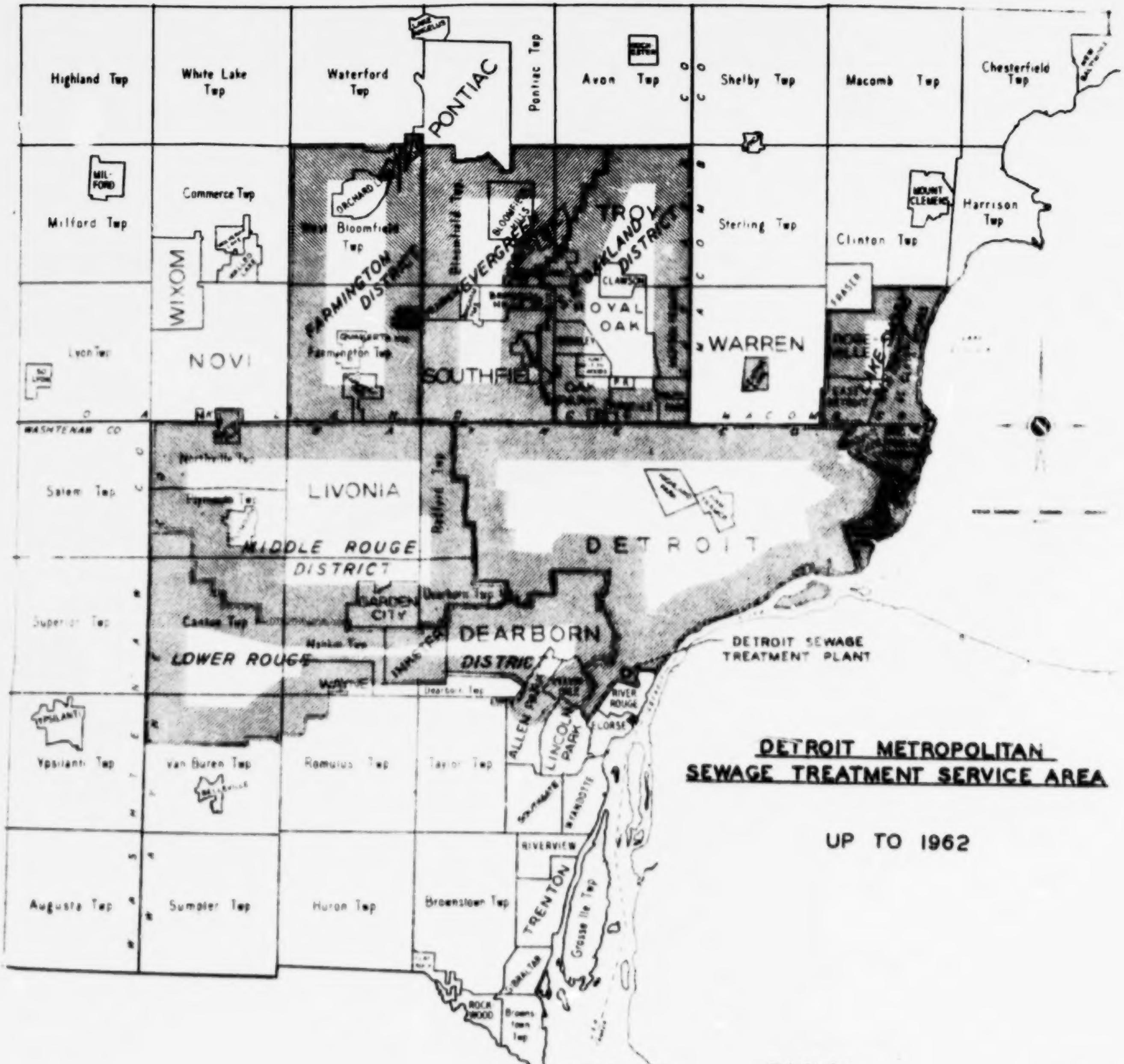
E. Detroit Sewage Disposal System - Enlargement and Improvement Program, dated July 22, 1957

This program presents a step-by-step schedule for plant and interceptor additions to provide sewage treatment facilities for 4,000,000 pepple by 1980. It is estimated that these improvements and additions will cost $32,794,000. However, it should be understood that we are not limiting the Sewage Treatment Plant to 2000 c.f.s., or a population of 4,000,000. Any additions and improvements that are necessary to serve the load we have shall be made. The program was approved by Michigan State Health Officials.

(See Exhibit 2.4)

(The Exhibits referred to in Section 2 are as follows:)

439a

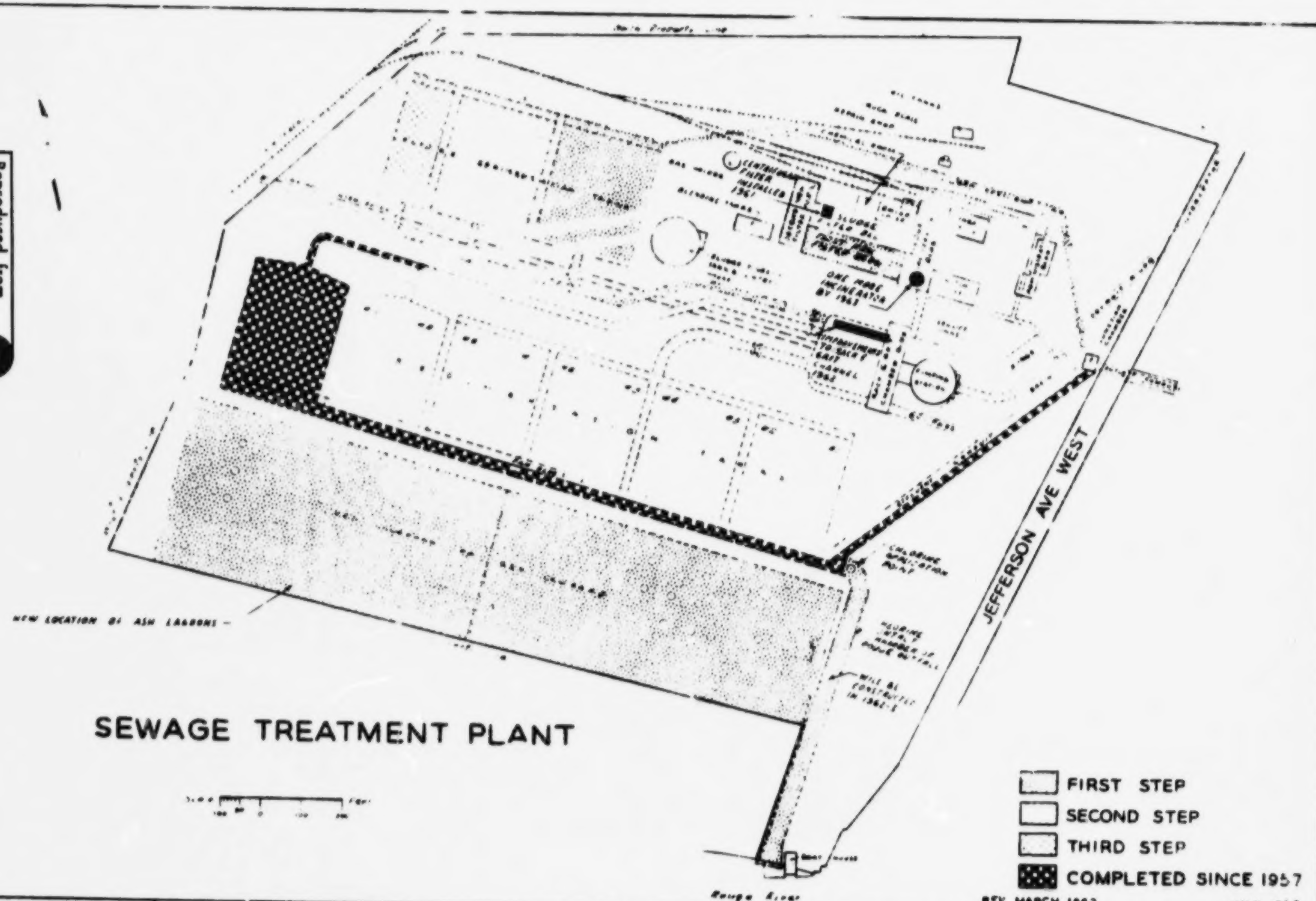


Highland Twp
White Lake Twp
Waterford Twp
PONTIAC
Pontiac Twp
Avon Twp
Shelby Twp
Macomb Twp
Chesterfield Twp
MIL-FORD
Milford Twp
Commerce Twp
ORCHARD L
West Bloomfield Twp
Bloomfield Twp
BLOOMFIELD HILLS
TROY
Sterling Twp
MOUNT CLEMENS
Clinton Twp
Harrison Twp
WIXOM
NOVI
Lyon Twp
FARMINGTON DISTRICT
Farmington Twp
EVERGREEN
OAKLAND DISTRICT
CLAWSON
ROYAL OAK
SOUTHFIELD
WARREN
FRASER
ROSE-VILLE
WASHTENAW CO
MACOMB
Salem Twp
Northville Twp
LIVONIA
Redford Twp
DETROIT
MIDDLE ROUGE DISTRICT
Superior Twp
Canton Twp
GARDEN CITY
Dearborn Twp
DEARBORN
Nankin Twp
LOWER ROUGE
DISTRICT
WAYNE
DETROIT SEWAGE TREATMENT PLANT
RIVER ROUGE
ECORSE
ALLEN PARK
LINCOLN PARK
Ypsilanti Twp
Van Buren Twp
Romulus Twp
Taylor Twp
SOUTHGATE
WYANDOTTE
RIVERVIEW
Augusta Twp
Sumpter Twp
Huron Twp
Brownstown Twp
TRENTON
Grosse Ile Twp
GIBRALTAR
ROCKWOOD
Browns-town Twp

## DETROIT METROPOLITAN SEWAGE TREATMENT SERVICE AREA

### UP TO 1962

Exhibit 2.1


JEFFERSON AVE WEST
CENTRIFUGAL FILTER INSTALLED 1961
SLUDGE FILTER
ONE MORE INCINERATOR BY 1963
IMPROVEMENTS TO RACK & GRIT CHANNEL 1962
CHLORINE APPLICATION POINT
WILL BE CONSTRUCTED IN 1962-3
NEW LOCATION OF ASH LAGOONS
Rouge River

# SEWAGE TREATMENT PLANT

| | |
|---|---|
| ☐ | FIRST STEP |
| ☐ | SECOND STEP |
| ▨ | THIRD STEP |
| ▩ | COMPLETED SINCE 1957 |

REV. MARCH 1962

JULY 1957

DESIGNED BY
DRAWN BY
TRACED BY
CHECKED BY

ENLARGEMENT PROGRAM
GENERAL PLAN SHOWING
ADDITIONS IN THREE STEPS

CITY OF DETROIT
DEPARTMENT OF WATER SUPPLY
DIVISION OF ENGINEERING

EXHIBIT 2.2

Reproduced from best available copy.

Exhibit 2.3 (Contd.)

**Suburbs:**

| Interceptors and Pumping Stations | Date Completed | Cost |
|---|---|---|
| Grosse Pointe Woods - Harper Woods | 1959 | $6,318,950 |
| Milk River Flood Control Station | | |
| Pumping Station, storage and retention ponds | | |
| Grosse Pointe Park | | |
| Additions to pumping station | 1961 | $ 175,000 |
| Dearborn E. Side, Sewage Treatment Plant connected to Detroit | 1960 | $ 500,000 |
| Allen Park - connected to Detroit | 1959 | $ 30,000 |
| Farmington and Evergreen - Farmington District | 1960 and 1962 | $15,000,000 |
| Sanitary interceptors, pumping stations and trunk sewers to deliver sewage to Detroit for treatment | | |
| Farmington | 1958 | $ 800,000 |
| Sanitary interceptor to Detroit for treatment and treatment of combined sewer overflows (settling, chlorination and dewatering to interceptor) | | |
| | Total: | $22,823,950 * |

* These figures do not include any storm sewerage facility costs.

Exhibit 2.3

## DETROIT'S SEWAGE DISPOSAL SYSTEM ADDITIONS, 1957-1962

### Sewage Treatment Plant Additions

| | Date Completed | Cost |
|---|---|---|
| One fly ash collector | 1959 | $ 95,989 |
| Two sedimentation tanks | 1960 | $1,800,000 |
| Enlarged effluent conduit | 1961 | $ 676,500 |
| Employees service building | 1961 | $ 87,495 |
| One centrifugal filter | 1961 | $ 60,000 |
| New chlorinators | 1961 | $ 19,085 |
| | Total: | $2,739,069 |
| To be constructed -- 1962-63: | | |
| Rouge River outfall | | $ 750,000 |
| One multiple-hearth incinerator | | $ 740,000 |
| | | $1,490,000 |
| | | $4,229,069 |

### Interceptors, Regulators and Sanitary Pumping Stations

| | Date Completed | Cost |
|---|---|---|
| Regulator and diversion works W. McNichols | 1958 | $ 99,107 |
| Repairs, N.W. Interceptor at Southfield | 1960 | $ 211,320 |
| Conner Sanitary Pumping Station | 1961 | $ 949,046 |
| River Rouge Section, N.W. Interceptor | 1961 | $1,328,000 |
| Rouge Siphon " " | 1961-62 | $ 639,000 |
| Back water gates, Chicago and Tireman | 1961 | $ 238,636 |
| | Total: | $3,465,109 |
| | | $7,694,178 |

## STORM FLOWS

A. The Detroit Sewage Treatment Plant treats storm flow to the extent that the large size storm drains can store "flow". The regulator construction and plant operating practices combine to provide treatment for a considerable amount of street run-off.

B. The designed capacity of the plant and the interceptors is to handle 324 gallons per day per capita. The water consumption is 154 gallons per day per capita and less during storm period. The excess capacity over normal flow is for storm water treatment.

C. The City of Detroit has spent $350,000,000 on trunk and public sewers, not including laterals. The area system probably has cost at least $500,000,000.

D. The Detroit practice of treating storm flows to the extent we do more than leads the field in that most local areas are now only wrestling with sanitary flow. The storm flows in Canada and adjacent United States areas to Detroit are not treated. In addition, all adjacent truck farm areas liberate large amounts of insecticides and fertilizers. Therefore, improvement above that practiced by Detroit on storm flow treatment should not be advanced except that it be adopted for the area.

## SECTION 4

## PRESENT DEVELOPMENTS

### A. Status of Detroit River at Present

### Detroit Department of Water Supply Sampling Data - Detroit River

For many years the Detroit Department of Water Supply has sampled the Detroit and Rouge Rivers to learn the sanitary quality of these waters. From May until the middle of October, weekly samples have been taken on ranges across the Detroit River from United States to Canada. The locations of these are as follows:

Range 5A -- From Zug Island waste bed to Canada, 700 feet above outfall

Range 6A -- Zug Island, across outfall to Canada, 100 feet above Rouge River

Range 7A -- Detroit Edison River Rouge Station to Canada, 400 feet below Rouge River

Range 8A -- Great Lakes Steel, north end to head of Fighting Island, then due east to Canada

Range 58 -- Wyandotte to head of Grassy Island to Fighting Island

Samples are also collected weekly throughout the year across the Trenton Channel Toll Bridge and the Rouge River at Jefferson Avenue. Monthly samples are collected along the Rouge River from Eight Mile Road to Jefferson Avenue. Samples are also collected once a year during the summer down river and along the Lake Erie shore as far as Sterling State Park.

(Exhibit 4.1 & 4.1A)

The Detroit River samples collected during the past three years have shown the sanitary quality of the water as far downriver as the Trenton Channel to be improving. In fact, the trend is definitely towards better quality. The bacteriological pollution present is along the American and Canadian shores.

(See Exhibit 4.2)

Rouge River:

The Rouge River shows increasing bacteriological pollution, with the largest increase during the past year. (See Exhibit 4.3) The flows through the Rouge River at the Jefferson Avenue Bridge approximate that through the Detroit Sewage Treatment outfall due to the large quantities of water taken from the old arm of the Rouge River and released at the Rouge Plant by the Ford Motor Car Company.

Bacteriological Quality Related to Depths:

Most bacteriological sampling of rivers is done at or near the surface of the stream. This type of sampling determines the surface quality only. It is questionable if surface sampling reflects the true bacteriological quality of the river. Evidence exists to show that depth sampling will show less pollution.

## Fishing in Lake Erie and the Detroit River:

It is a well known fact that fish will not remain in heavily polluted waters. Yet pickerel and perch are caught in the entire length of the Detroit River and also in the western end of Lake Erie. This evidence substantiates the theory that the pollution is mainly near the surface.

The Detroit News, on March 4, 1962, reported record catches of perch in Lake Erie off Monroe County. Fishermen are advised by the Conservation Officer to walk out from the shore at Luna Pier, Bolles Harbor, Avalon Beach and Sterling State Park.

(See Exhibit 4.41)

## I.J.C. Data on Detroit and Rouge Rivers:

The I.J.C. data over the past three years have not always covered the same ranges across the Detroit River. In two cases the same ranges were sampled, namely, Dt. 14. W and Dt. 12. OW. The results agree with those of the Department of Water Supply. There has been a decrease in the coliform pollution over the past years downstream as far as Trenton Channel.

Their data on the Rouge River agree with that obtained by the Detroit Department of Water Supply also in that they show an increase in coliform pollution during the past three years.

(See Exhibit 4.5)

Aerial Picture of Junction of Rouge and Detroit Rivers:

(See Exhibit 4.6)

This color photo shows the location of the treatment plant outfall and flow very clearly. It is located in the upper right hand corner about 200 feet above the Rouge River and about 400 feet from shore. Contamination upstream from the outfall can also be seen as well as heavy pollution coming from the Rouge River. There is little mixing of the outfall flow and the Rouge flow until they blend several hundred feet below the Rouge. The outfall flow rises to the surface.

B. The Michigan Department of Health Engineering Division and the Michigan Water Resources Commission on January 8, 1962, issued a report titled: "Some Significant Accomplishments and Trends in Pollution Control in the Greater Detroit Metropolitan Area During the Period 1957-1962."

During this period, projects to control pollution valued at $52,620,000 have been completed, and those in progress or scheduled for 1962 are valued at $51,200,000, or a total of $103,820,000.

Excerpts from this report are as follows:

"Today the communities and industries in the Greater Detroit Metropolitan area are culminating a period of coordinated effort in pollution control. This is demonstrated by the number, type and magnitude of waste treatment works completed or scheduled for completion this year in all sections of this six county area. Most of the municipal installations will have reserves in capacity sufficient to meet the needs of anticipated growth until 1980 or later. Some are planned for ultimate development of the community.

"The principle of a coordinated system of interceptor sewers serving several communities delivering sewage to a central treatment works has gained favor in the last decade in several new areas. The framework for such a system was developed in the mid-thirties by Detroit and Wayne County. During the past five years this system has been expanded and strengthened in major portions of the fast growing areas of Oakland County and Macomb County. Wayne County is almost wholly dependent upon three major and other minor systems of this kind. These coordinated multi-community facilities have removed most of the pollution from the lower end of Lake St. Clair. By June, 1962, pollution from sewage will be largely eliminated from all branches of the Rouge River. By these means health hazards and conditions of nuisance will be effectively reduced for large segments of the population.

". . . That the tempo of construction of control facilities throughout the area has been accelerated tremendously since 1959 is very evident. Equally obvious is the increased protection to the Lake Erie, Lake St. Clair, the Detroit River and the tributary streams which the facilities now under construction or to be commenced this year will provide when completed.

"Increasing emphasis on effective disinfection for bacteriological control of effluents will assure improvements in water quality in the receiving waters as the new projects are completed and placed in operation. This is an important and significant trend in both present and future installations.

"For the future many communities are preparing either by themselves, or through county agencies, to assess future needs and how best to meet them. Several outstanding examples illustrate this trend. The City of Detroit is continuing to broaden its long range plan to serve the metropolitan area with waste transportation facilities. Wayne County, through its Department of

Public Works, is planning how to extend its interceptor and treatment system for the entire county beyond 1980 to ultimate development. Oakland County, through its Department of Public Works, is planning facilities for the Clinton River and Huron Basins. Communities in the Huron River basin in Washtenaw County have adopted a water use management policy for the Lower Huron River. Thus the stage is being set to meet the needs of a growing dynamic society years in advance. This is a healthy and progressive approach which bids fair to continue the shift from corrective action to prevention -- to be ahead rather than behind in pollution control."

C. Michigan Department of Health Approval of Detroit Sewage Disposal System Enlargement and Improvement Program, July 22, 1957

At a meeting in Lansing, Michigan, on July 22, 1957, between representatives of the Engineering Division of the Michigan Department of Health and Engineers of the Detroit Department of Water Supply, the enlargement and improvement program for the Detroit Sewage Disposal System was tentatively approved with the exception of the Rouge overflow outlet channel.

In a letter of March 14, 1958, the formal approval for the auxiliary outfall to the Rouge River was given. This completed the approval for the whole project.

Approvals from Wayne, Oakland and Macomb Counties were obtained. On May 13, 1958, the Common Council of the City of Detroit took formal action approving and authorizing the program, whichis in effect now.

(See Exhibit 4.7)

D. Facilities under construction or about to go in service in the immediate area of Detroit to abate pollution are valued at approximately $29,000,000.

(See Exhibit 4.8)

Rouge Valley Sewage Disposal System, Exhibit 4.9
Down River Sewage Disposal System, Exhibit 4.10
Northeast Interceptor District, Exhibit 4.11

E. Dequindre Interceptor -- 1962-63

An auxiliary sanitary interceptor to deliver sewage from Southeastern Oakland County Sewage Disposal District to Detroit for treatment has been planned. In addition, facilities for storage and retention of overflows from the combined sewers with subsequent dewatering to the interceptor are to be built.

The purpose of the above is to prevent untreated sewage to flow into Red Run Drain and the Clinton River.

| | |
|---|---|
| Cost of interceptor alone | -- $4,500,000 |
| With Combined sewer overflow controls | -- 7,000,000 |

Twelve Towns Drain

In this same area, a relief sewer project is proposed to carry off storm waters, thus preventing flooding and health hazards from a mixture of sewage and storm water.

(The Exhibits to Section 4 are as follows:)

449-a

Exhibit 4.1

## TYPICAL WINTER AND SUMMER MONTHS
## UPPER ROUGE BACTERIOLOGICAL DATA

February 18, 1959

| Sample No. | Location of Sample | Water Temp. °F. | D.O. PPM | % St'd | B.O.D. PPM | Coliform Index-M.P.N. |
|---|---|---|---|---|---|---|
| 1-A | 8-Mile at Telegraph | 32 | 9.6 | 66 | 11 | 4,400 |
| 1 | 8-Mile at Berg Rd. | 32 | 4.4 | 30 | 12 | 93,000 |
| 2 | 7-Mile Rd. | 32 | 9.9 | 68 | 12 | 9,300 |
| 3 | 6-Mile Rd. | 32 | 10.2 | 70 | 12 | 2,300 |
| 4 | 5-Mile Rd. | 32 | 10.9 | 75 | 13 | 43,000 |
| 5 | Telegraph-Bell Branch | 32 | 10.6 | 73 | 14 | 43,000 |
| 6 | Schoolcraft | 32 | 10.0 | 68 | 12 | 43,000 |
| 7 | Plymouth | 32 | 9.8 | 67 | 12 | 93,000 |
| 8 | Joy Road | 32 | 10.0 | 68 | 12 | 43,000 |
| 9 | Telegraph-Middle Branch | 32 | 11.3 | 77 | 18 | 23,000 |
| 10 | Warren Road | 32 | 10.2 | 70 | 14 | 43,000 |
| 11 | Ford Road | 32 | 10.4 | 71 | 14 | 75,000 |
| 12 | Telegraph-Lower Branch | 32 | 11.9 | 81 | 18 | * |
| 13 | Southfield Road | 32 | 10.7 | 73 | 19 | 93,000 |
| 14 | Rotunda Drive | 32 | 10.6 | 73 | 24 | 93,000 |
| 15 | Greenfield Road | 33 | 10.5 | 73 | 36 | 230,000 |
| 16 | Schaefer Road | 37 | 9.7 | 72 | 24 | 430,000 |
| 17 | Dix Road | 40 | 9.7 | 75 | 16 | 230,000 |
| 18 | Fort Street | 39 | 10.7 | 81 | 16 | 93,000 |
| 19 | Jefferson Avenue | 41 | 9.9 | 77 | 18 | 230,000 |

* Sample Lost.

4497

## UPPER ROUGE BACTERIOLOGICAL DATA

## August 31, 1959

| Sample No. | Location of Sample | Water Temp °F. | D.O. P.P.M. | % Sat'd | B.O.D. P.P.M. | Coliform Index M.P.N. |
|---|---|---|---|---|---|---|
| 1-A | 8-Mile Road | 74 | 3.5 | 41 | 4 | 9,300 |
| 1 | 8-Mile Road | 74 | 3.6 | 42 | 6 | 15,000 |
| 2 | 7-Mile Road | 75 | 4.3 | 50 | 4 | 7,500 |
| 3 | 6-Mile Road | 74 | 4.9 | 56 | 5 | 15,000 |
| 4 | 5-Mile Road | 76 | 3.3 | 39 | 5 | 23,000 |
| 5 | Telegraph-Bell Branch | 75 | 3.6 | 42 | 7 | 43,000 |
| 6 | Schoolcraft | 74 | 2.5 | 29 | 5 | 23,000 |
| 7 | Plymouth | 74 | 1.8 | 21 | 4 | 21,000 |
| 8 | Joy Road | 76 | 1.1 | 13 | 6 | 210,000 |
| 9 | Telegraph-Middle Branch | 76 | 3.3 | 39 | 4 | 43,000 |
| 10 | Warren Road | 76 | 0 | 0 | 9 | 4,600,000 |
| 11 | Ford Road | 74 | .8 | 9 | 7 | 930,000 |
| 12 | Telegraph-Lower Branch | 72 | 1.1 | 13 | 7 | 2,400,000 |
| 13 | Southfield Road | 74 | 2.1 | 25 | 5 | 2,400,000 |
| 14 | Rotunda Drive | 74 | 0.8 | 10 | 6 | 930,000 |
| 15 | Greenfield Road | 74 | 1.3 | 16 | 11 | 2,400,000 |
| 16 | Schaefer Road | 83 | 1.2 | 15 | 6 | 930,000 |
| 17 | Dix Road | 86 | 0.6 | 8 | 6 | 2,400,000 |
| 18 | Fort Street | 84 | 0 | 0 | 6 | 930,000 |
| 19 | Jefferson Avenue | 83 | 0 | 0 | 10 | 1,500,000 |

449c

## UPPER ROUGE BACTERIOLOGICAL DATA

### January 28, 1960

| Sample No. | Location of Sample | Water Temp. | D.O. P.P.M. | % Sat'd | B.O.D. P.P.M. | Coliform Index M.P.N. |
|---|---|---|---|---|---|---|
| 1A | 8-Mile Road | 34 | 11.5 | 81 | 2 | 93,000 |
| 1 | 8-Mile Road | 34 | 9.2 | 65 | 9 | 93,000 |
| 2 | 7-Mile Road | 34 | 12.1 | 86 | 6 | 43,000 |
| 3 | 6-Mile Road | 32 | 12.5 | 85 | 6 | 43,000 |
| 4 | 5-Mile Road | 33 | 12.2 | 85 | 7 | 43,000 |
| 5 | Telegraph-Bell Branch | 32 | 11.9 | 81 | 8 | 240,000 |
| 6 | Schoolcraft | 32 | 12.0 | 82 | 9 | 240,000 |
| 7 | Plymouth | 32 | 11.8 | 81 | 9 | 240.000 |
| 8 | Joy Road | 34 | 11.0 | 78 | 11 | 240.000 |
| 9 | Telegraph-Middle Branch | 34 | 12.6 | 89 | 7 | 23,000 |
| 10 | Warren Road | 34 | 10.5 | 74 | 13 | 240,000 |
| 11 | Ford Road | 34 | 10.7 | 75 | 12 | 460,000 |
| 12 | Telegraph-Lower Branch | 34 | 11.4 | 80 | 18 | 240,000 |
| 13 | Southfield Road | 32 | 11.1 | 76 | 14 | 240,000 |
| 14 | Rotunda Drive | 35 | 10.5 | 75 | 15 | 230.000 |
| 15 | Greenfield Road | 40 | 8.3 | 64 | 22 | 2.400,000 |
| 16 | Schaefer Road | 41 | 9.3 | 73 | 21 | 2,400,000 |
| 17 | Dix Road | 44 | 10.6 | 86 | 13 | 93,000 |
| 18 | Fort Street | 44 | 10.3 | 84 | 10 | 150,000 |
| 19 | Jefferson Ave. | 44 | 9.4 | 77 | 9 | 93,000 |

449 d

## UPPER ROUGE BACTERIOLOGICAL DATA

July 21, 1960

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| Sample No. | Location of Sample | Temp. °F. | D.O. P.P.M. | % Sat'd | B.O.D. P.P.M. | Coliform Index, M.P.N. |
|---|---|---|---|---|---|---|
| 1A | 8-Mile Road at Telegraph | 66 | 5.1 | 54 | 3 | 23,000 |
| 1 | 8-Mile Road at Berg Road | 67 | 2.5 | 27 | 5 | 43,000 |
| 2 | 7-Mile Road | 68 | 6.7 | 74 | 4 | 93,000 |
| 3 | 6-Mile Road | 68 | 7.5 | 81 | 4 | 23,000 |
| 4 | 5-Mile Road | 68 | 4.3 | 47 | 5 | 9,300 |
| 5 | Telegraph-Bell Branch | 70 | 12.1 | 134 | 9 | 360 |
| 6 | Schoolcraft | 67 | 4.8 | 52 | 6 | 9,300 |
| 7 | Plymouth | 70 | 5.8 | 65 | 6 | 4,300 |
| 8 | Joy Road | 69 | 1.3 | 14 | 8 | 1,100,000 |
| 9 | Telegraph-Middle Branch | 68 | 2.9 | 32 | 6 | ≥ 2,400,000 |
| 10 | Warren Road | 68 | 0 | 0 | ≥ 19 | 240,000 |
| 11 | Ford Road | 68 | 0 | 0 | ≥ 19 | 9,300 |
| 12 | Telegraph-Lower Branch | 69 | .5 | 1 | 9 | 93,000 |
| 13 | Southfield | 72 | 0 | 0 | 17 | ≥ 2,400,000 |
| 14 | Rotunda Drive | 75 | 0 | 0 | ≤ 19 | 2,400,000 |
| 15 | Greenfield Road | 78 | 0 | 0 | 19 | 2,400,000 |
| 16 | Schaefer Road | 80 | 0 | 0 | 17 | 2,400,000 |
| 17 | Dix Road | 82 | .8 | 1 | 7 | 930,000 |
| 18 | Fort Street | 82 | 1.9 | 23 | 5 | 430,000 |
| 19 | Jefferson Avenue | 80 | .7 | 1 | 4 | 230,000 |

449e

## UPPER ROUGE BACTERIOLOGICAL DATA

## February 21, 1961

| Sample No. | Location of Sample | Water Temp. °F. | D.O. P.P.M. | % Sat'd | B.O.D. P.P.M. | Coliform Index, M.P.N. |
|---|---|---|---|---|---|---|
| 1A | 8-Mile Road at Telegraph | 37 | 9.8 | 72 | 8 | 93,000 |
| 1 | 8-Mile Road at Berg Road | 33 | 5.1 | 35 | 10 | 93,000 |
| 2 | 7-Mile Road | 32 | 10.1 | 69 | 10 | 2,300 |
| 3 | 6-Mile Road | 32 | 10.8 | 74 | 10 | 2,300 |
| 4 | 5-Mile Road | 32 | 10.3 | 70 | 10 | 43,000 |
| 5 | Telegraph--Bell Branch | 32 | 7.4 | 51 | 8 | 93,000 |
| 6 | Schoolcraft | 33 | 9.6 | 67 | 8 | 120,000 |
| 7 | Plymouth | 34 | 9.2 | 65 | 10 | 93,000 |
| 8 | Joy Road | 33 | 8.7 | 60 | 12 | 93,000 |
| 9 | Telegraph--Middle Branch | 34 | 11.0 | 78 | 10 | 43,000 |
| 10 | Warren Road | 34 | 7.6 | 54 | 28 | 1,500,000 |
| 11 | Ford Road | 34 | 7.9 | 56 | 24 | 1,500,000 |
| 12 | Telegraph--Lower Branch | 34 | 7.4 | 52 | 17 | 2,400,000 |
| 13 | Southfield | 34 | 10.5 | 74 | 16 | 430,000 |
| 14 | Rotunda Drive | 34 | 9.8 | 69 | 18 | 930,000 |
| 15 | Greenfield Road | 40 | 9.3 | 72 | 24 | 1,500,000 |
| 16 | Schaefer Road | 44 | 9.3 | 76 | 24 | 2,400,000 |
| 17 | Dix Road | 44 | 9.9 | 81 | 6 | 230,000 |
| 18 | Fort Street | 44 | 10.8 | 88 | 8 | 150,000 |
| 19 | Jefferson Avenue | 44 | 9.8 | 80 | 6 | 9,300 |

449f

## UPPER ROUGE BACTERIOLOGICAL DATA

## August 24, 1961

| Sample No | Location of Sample | Water Temp. °F. | D.O. P.P.M. | % Sat'd | B.O.D. P.P.M. | Coliform Index, M.P.N. |
|---|---|---|---|---|---|---|
| 1A. | 8-Mile Road at Telegraph | 69 | 5.3 | 57 | 4 | 15,000 |
| 1. | 8-Mile Road at Berg Road | 69 | 2.9 | 32 | 4 | 93,000 |
| 2. | 7-Mile Road | 69 | 5.4 | 60 | 5 | 43,000 |
| 3. | 6-Mile Road | 69 | 4.7 | 52 | 3 | 460,000 |
| 4. | 5-Mile Road | 70 | 2.2 | 25 | 7 | ≥ 2,400,000 |
| 5. | Telegraph--Bell Branch | 70 | 2.8 | 31 | 15 | ≥ 2,400,000 |
| 6. | Schoolcraft | 70 | 1.5 | 17 | 9 | ≥ 2,400,000 |
| 7. | Plymouth | 70 | 0.3 | 3 | 9 | ≥ 2,400,000 |
| 8. | Joy Road | 70 | 0 | 0 | 16 | ≥ 2,400,000 |
| 9. | Telegraph--Middle Branch | 71 | 3.5 | 40 | 14 | 240,000 |
| 10. | Warren Road | 71 | 4.4 | 50 | 10 | 230,000 |
| 11. | Ford Road | 72 | 1.0 | 11 | 13 | 4,600,000 |
| 12. | Telegraph--Lower Branch | 71 | 1.9 | 21 | 9 | 230,000 |
| 13. | Southfield | 71 | 3.7 | 41 | 20 | 930,000 |
| 14. | Rotunda Drive | 72 | 0 | 0 | 22 | 2,400,000 |
| 15. | Greenfield Road | 71 | 0 | 0 | 56 | ≥ 24,000,000 |
| 16. | Schaefer Road | 76 | 0 | 0 | 24 | 4,600,000 |
| 17. | Dix Road | 80 | 1.1 | 14 | 4 | 230,000 |
| 18. | Fort Street | 78 | 2.1 | 25 | 8 | 430,000 |
| 19. | Jefferson Avenue | 80 | 0.3 | 4 | 10 | 430,000 |

## DETROIT RIVER BACTERIOLOGICAL - 1959
## LOWER RIVER AND LAKE ERIE SHORELINE SAMPLING
August 21, 1959

| Sample No. | Location | Coliform Index, M.P.N. | Temp. °F. | Observations |
|---|---|---|---|---|
| 1 | Ft. of Southfield | 240,000 | 81 | Turbid |
| 2 | Ft. of Superior, Wyandotte | 240,000 | 80 | |
| 3 | Boat Dock, Elizabeth Park, Trenton | 43,000 | 82 | " |
| 4 | Ft. of Coral Street, Gibraltar | 2,300 | 82 | " |
| 5 | Gibraltar Bay at Park | 9,300 | 82 | " |
| 6 | Ft. of Lee Road, Maple Beach | 15,000 | 88 | " |
| 7 | Silver Creek at River Road | 43,000 | 87 | " |
| 8 | Huron River at River Road | 24,000 | 86 | " |
| 9 | Estral Beach | 24,000 | 85 | " , Septic Odor |
| 10 | Swan Creek at River Road | 4,300 | 86 | " |
| 11-A | Point Aux Peaux at Point | 9,300 | 83 | " |
| 11-B | Point Aux Peaux at Dixon Drive | 4,300 | 85 | " |
| 13-A | Stony Point Haven at Shore | 2,300 | 83 | Low water, turbid |
| 13-B | Stony Point Haven, 350 ft. from Shore | 28 | 82 | " " |
| 14 | Sterling State Park at Shore | 23 | 80 | Few Bathers, No Boat Available. |

4499

(NOTE: Clear, hot, humid, 90° F., Wind W.,SW, 6 M.P.H., 10:00 A.M., 2:30 P.M.)

Exhibit 4.1A

449h

## DETROIT RIVER BACTERIOLOGICAL DATA--1960

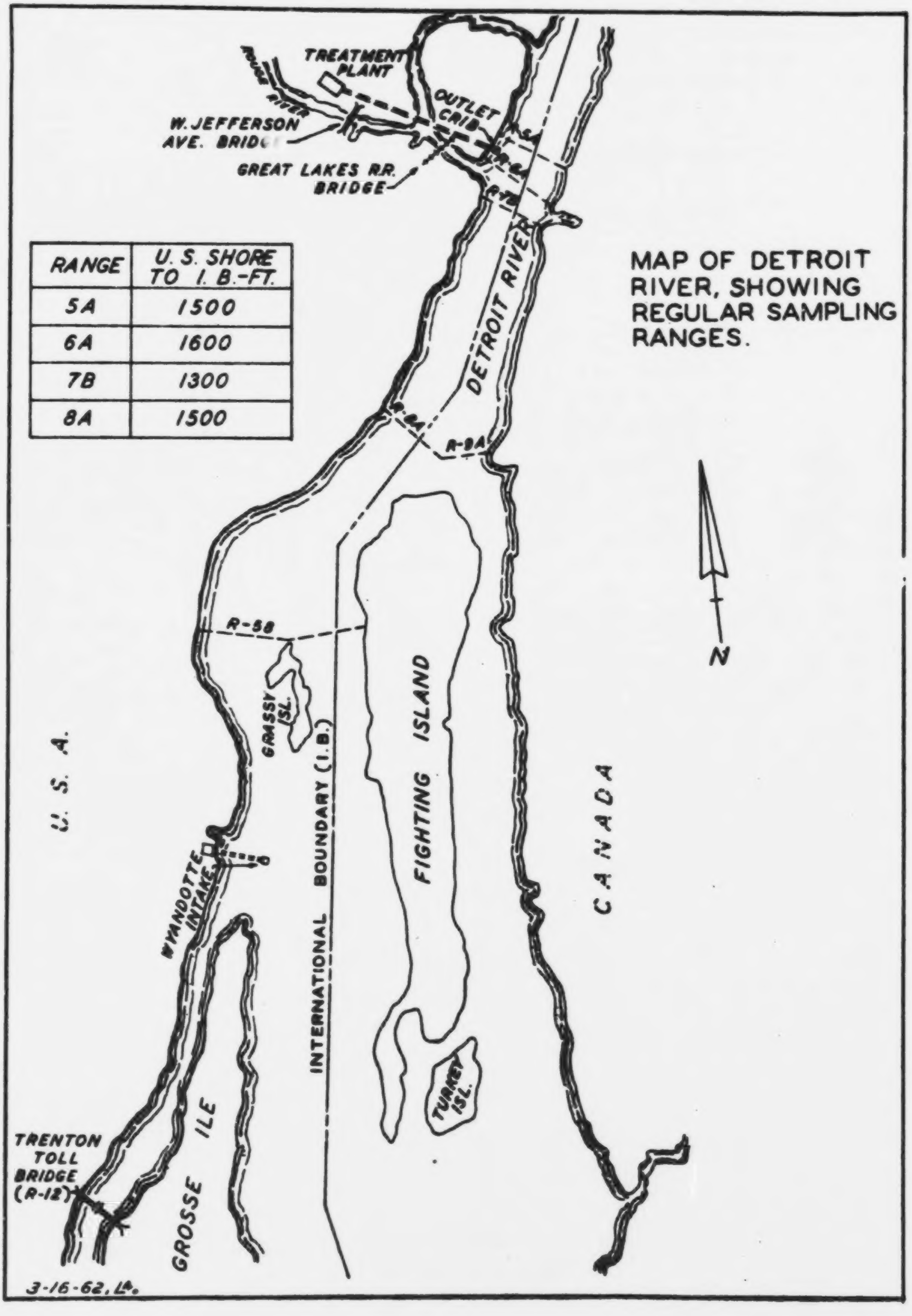
### LOWER RIVER AND LAKE ERIE SHORELINE SAMPLING
AUGUST 18, 1960

| Sample No. | Location | Coliform Index, M.P.N. | Temp. °F. | Observations |
|---|---|---|---|---|
| 1 | Ft. of Southfield | 9,300 | 76 | Turbid, Oil Slick. |
| 2 | Ft. of Superior, Wyandotte | 15,000 | 76 | Turbid. |
| 3 | Boat Dock, Elizabeth Park, Trenton | 1,500 | 77 | Turbid, Oil Slick. |
| 4 | Ft. of Coral St., Gibraltar | 15,000 | 79 | Turbid, Oil Slick. |
| 5 | Ft. of Bayview, Gibraltar | 9,300 | 79 | Dirty. |
| 6 | Ft. of Lee Road, Maple Beach | 23,000 | 79 | Dirty. |
| 7 | Silver Creek at River Road | 9,300 | 78 | Turbid, Slow Flow. |
| 8 | Huron River at River Road | 23,000 | 78 | Turbid, Slow Flow. |
| 9 | Estral Beach | 15,000 | 77 | Dirty. |
| 10 | Swan Creek, at River Road | 4,300 | 78 | Turbid, Slow Flow. |
| 11A | Point Aux Peaux at Point | 9,300 | 76 | Turbid, |
| 11B | Point Aux Peaux at Dixon Drive | 2,100 | 76 | Turbid,50 Bathers. |
| 13A | Stony Point Haven at Shore | 930 | 78 | Turbid. |
| 13B | Stony Point Haven, 100 ft. from Shore | 430 | 77 | Turbid, Pier Collapsed. |
| 14 | Sterling State Park, 300 ft. from Shore | 93 | 76 | Turbid, Clean, taken by boat<br>6 Bathers. |

**NOTE**:- Cloudy, humid, 1/2 mile visibility, 80° F., Wind E. S.E., 14 M.P.H., 9:45 a.m.--2:20 p.m.

449e

EXHIBIT 4.2

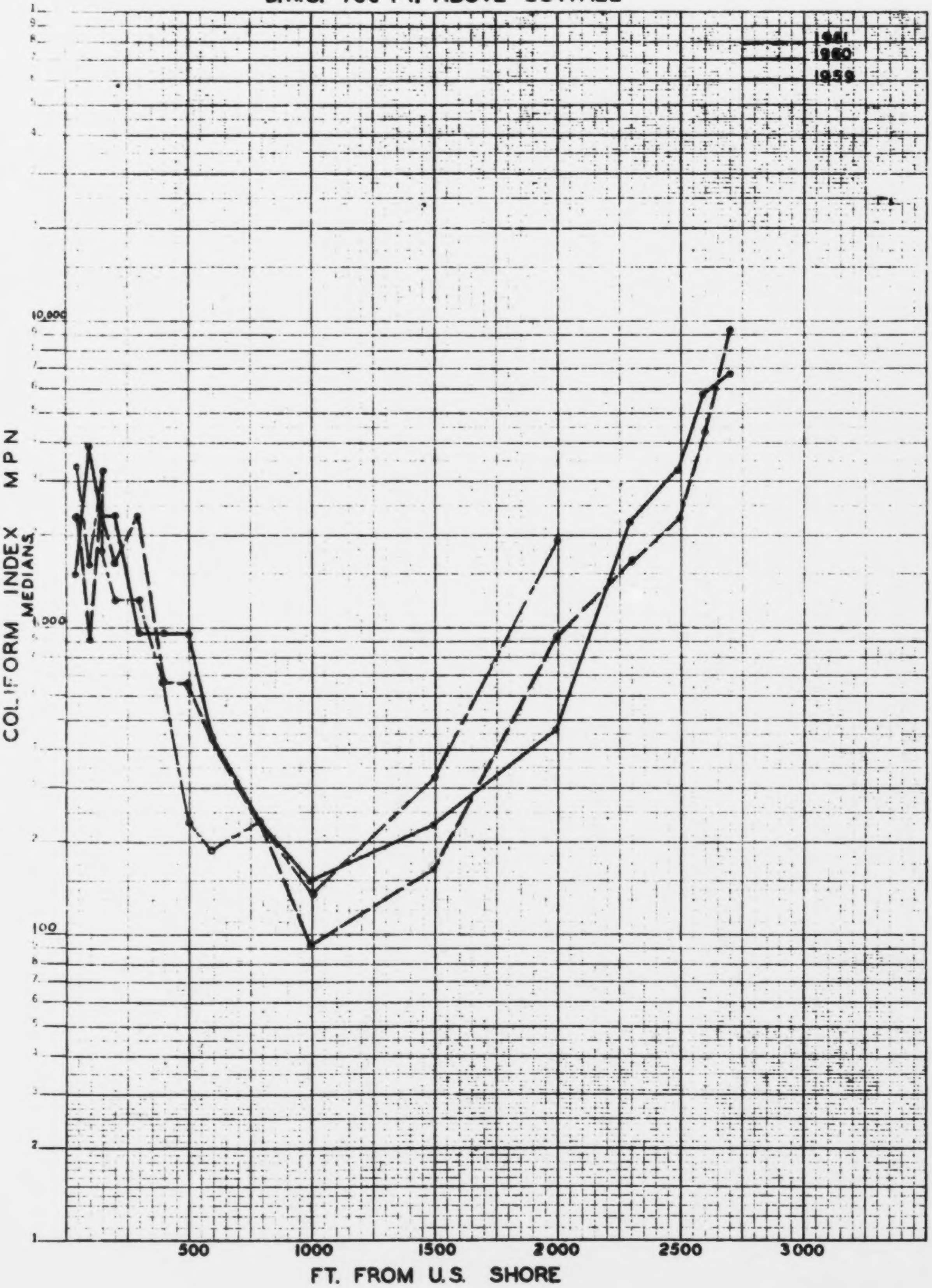

TREATMENT PLANT
ROUGE RIVER
W. JEFFERSON AVE. BRIDGE
OUTLET CRIB
GREAT LAKES R.R. BRIDGE
R-5A
R-6A
R-7B
DETROIT RIVER
R-8A
R-9A
R-5B
GRASSY ISL.
U. S. A.
WYANDOTTE INTAKE
INTERNATIONAL BOUNDARY (I.B.)
FIGHTING ISLAND
CANADA
TURKEY ISL.
GROSSE ILE
TRENTON TOLL BRIDGE (R-12)
N
3-16-62. LA.

| RANGE | U. S. SHORE TO I. B.-FT. |
|---|---|
| 5A | 1500 |
| 6A | 1600 |
| 7B | 1300 |
| 8A | 1500 |

MAP OF DETROIT RIVER, SHOWING REGULAR SAMPLING RANGES.

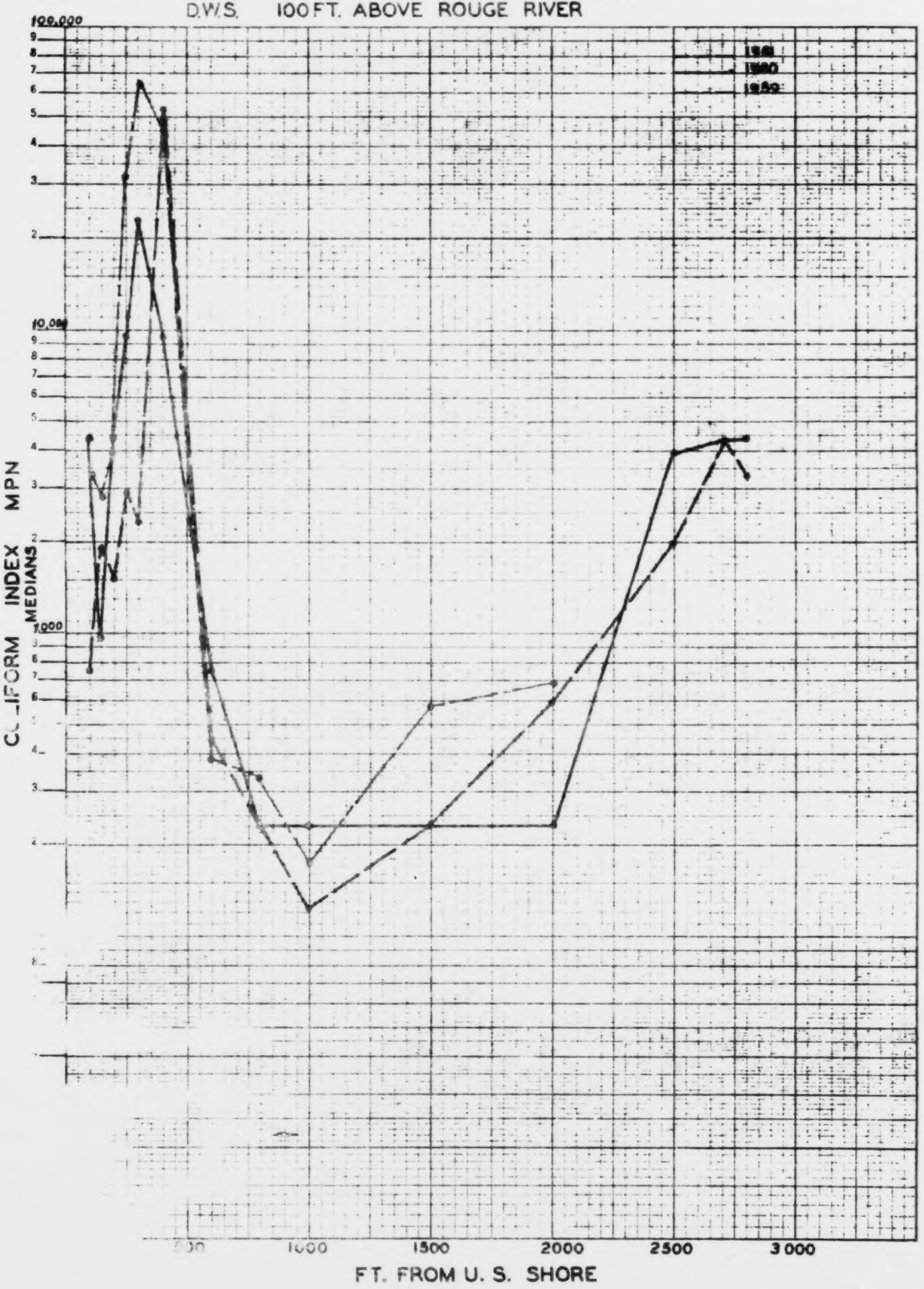
RANGE 9A

# ZUG ISLAND WASTE BED TO CANADA
## D.W.S. 700 FT. ABOVE OUTFALL



449k

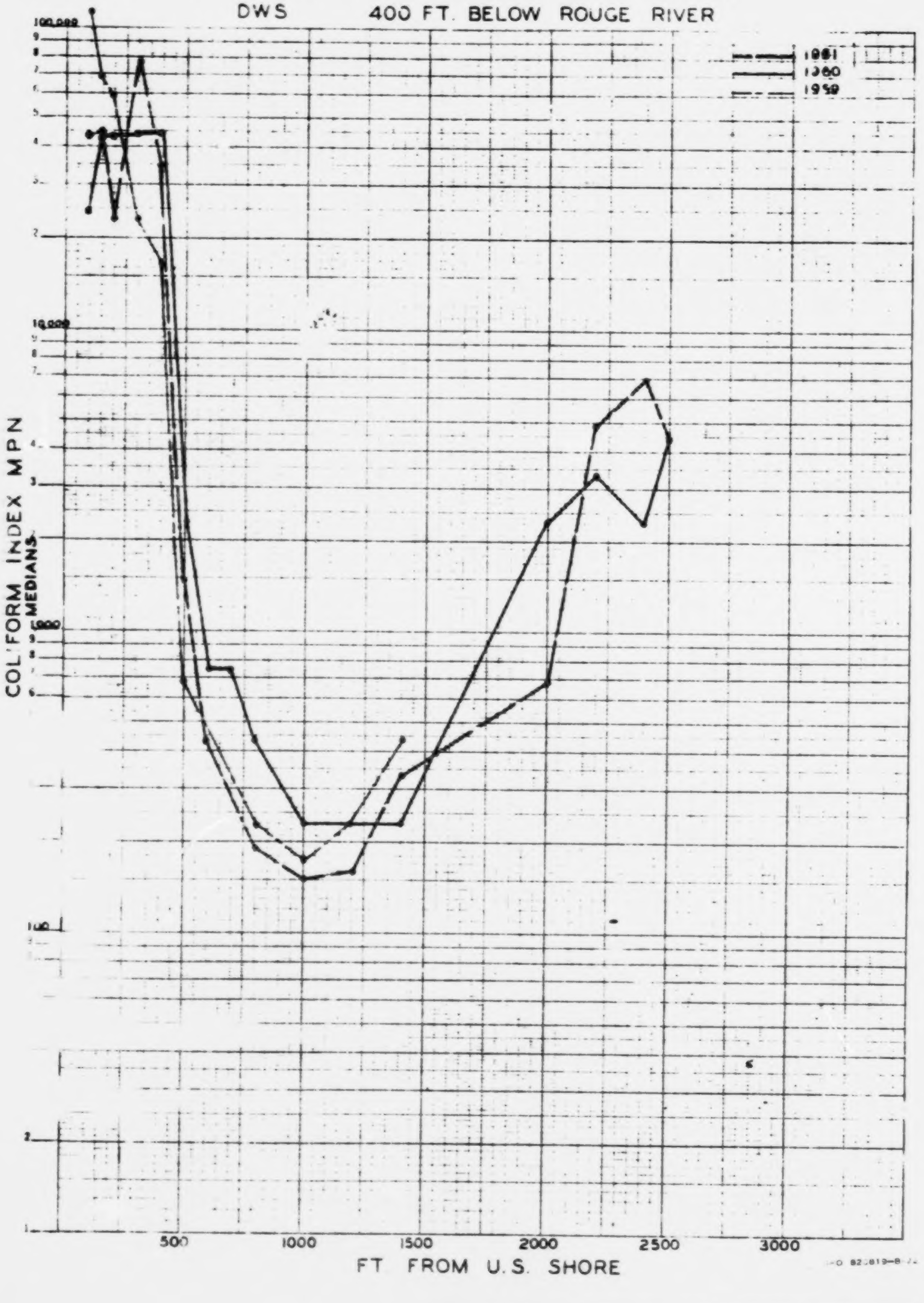
RANGE 6A ZUG ISLAND, ACROSS OUTFALL TO CANADA
D.W.S. 100 FT. ABOVE ROUGE RIVER



449l

RANGE 7B DET. ED CO. RIVER ROUGE STA. TO CANADA

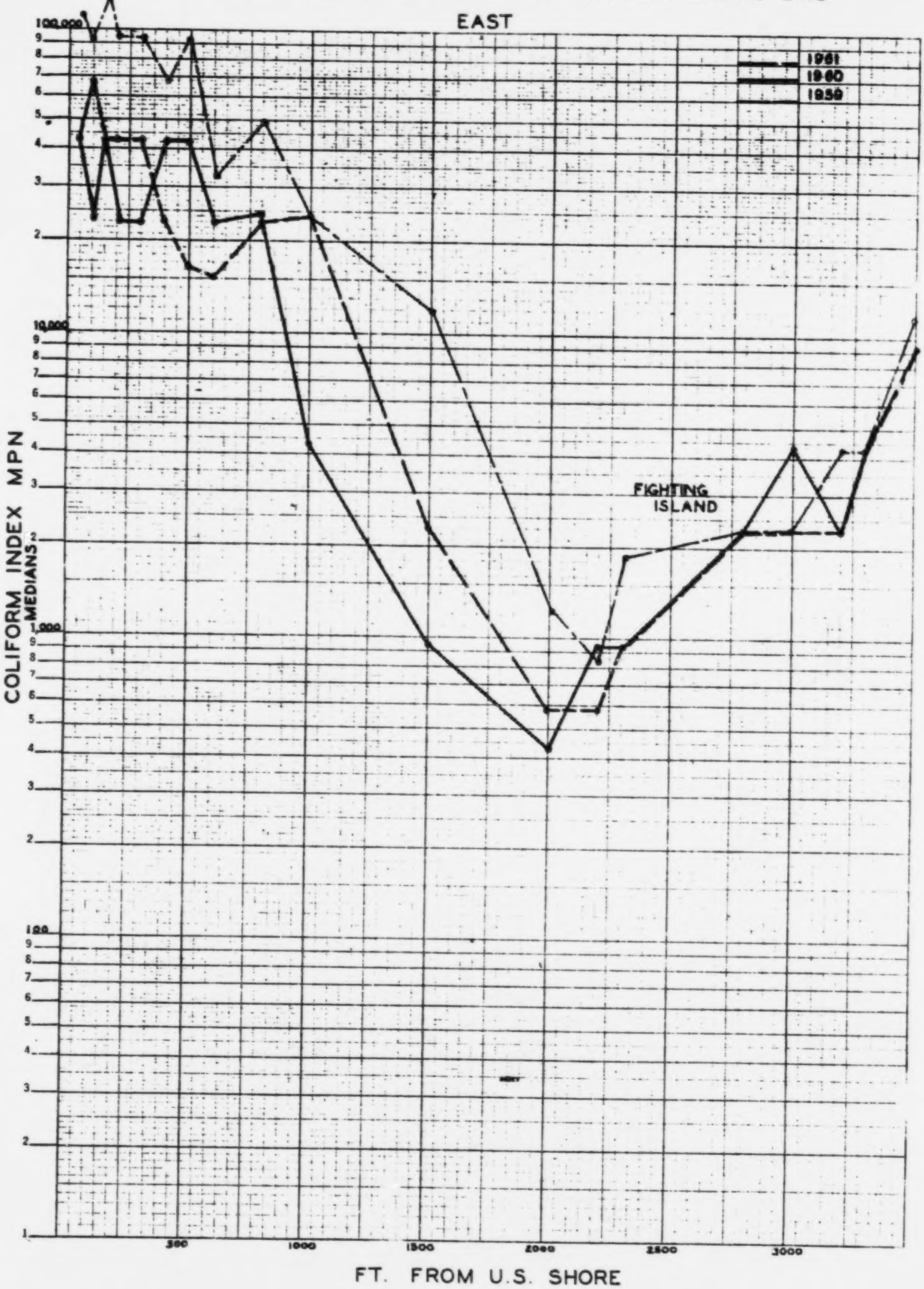
DWS 400 FT. BELOW ROUGE RIVER



GPO 820819—8

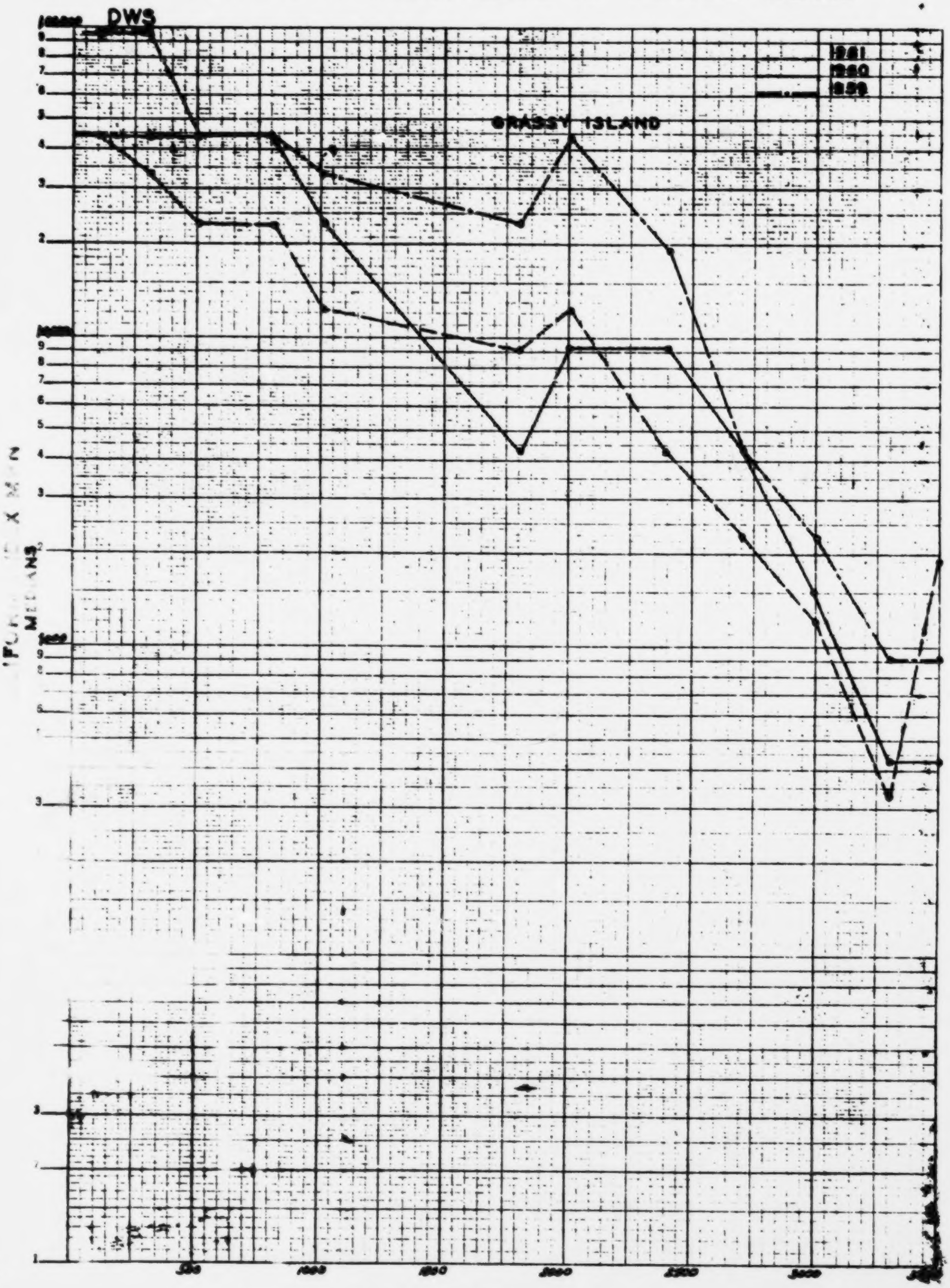
449m

RANGE 8A GT. LAKES STEEL, N. END TO HD. FIGHTING ISLAND DWS.



449n

RANGE 58 WYANDOTTE TO GRASSY ISLAND TO FIGHTING ISLAND



FT. FROM U. S. SHORE

4490

RANGE 12

## TRENTON CHANNEL - TOLL BRIDGE

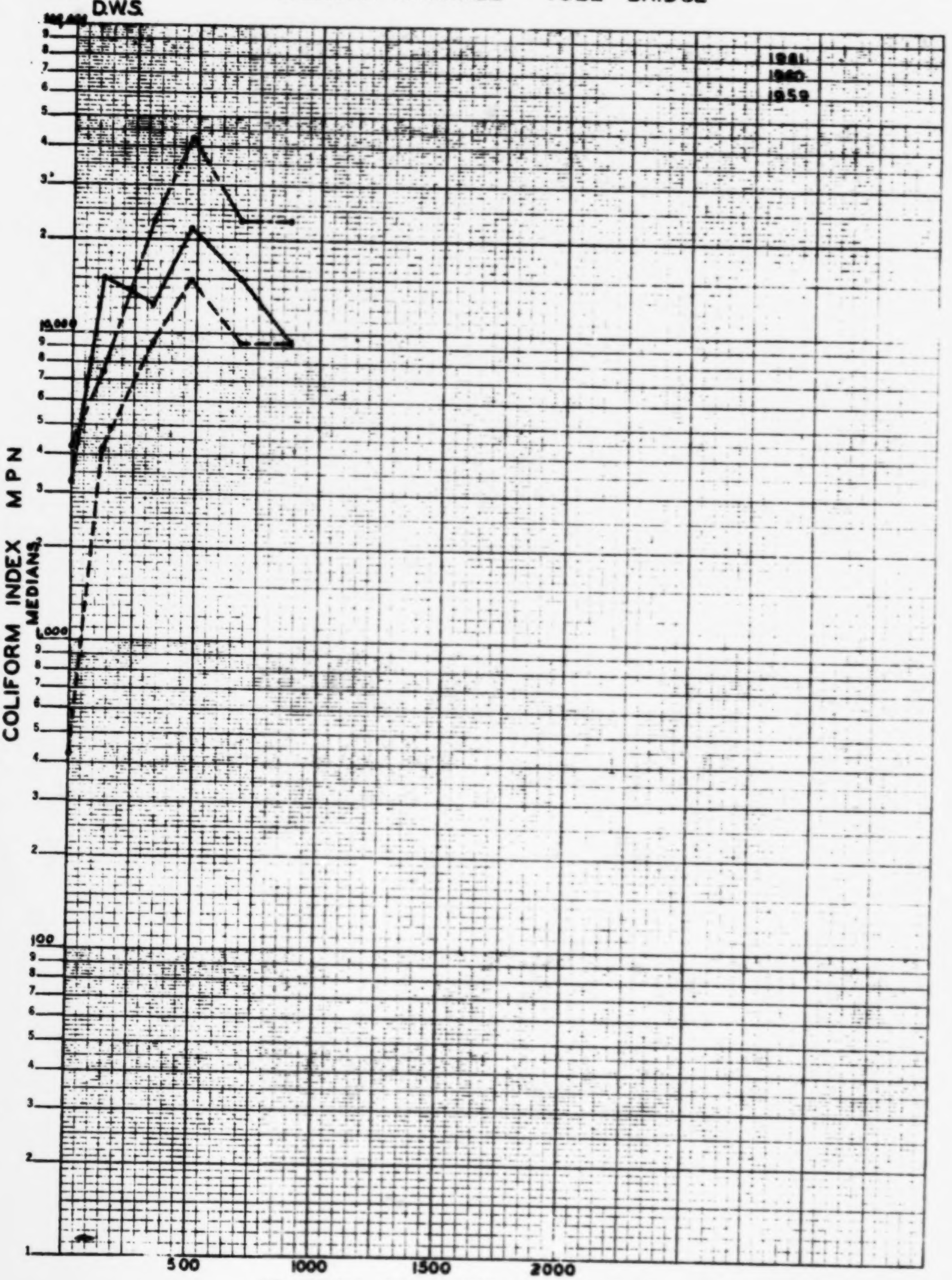


Exhibit 4.3

## ROUGE RIVER BACTERIOLOGICAL COUNTS
## WEST JEFFERSON AVENUE BRIDGE

Detroit Department of Water Supply

Samples collected once a week throughout the year

Median Values:

1959 -- 150,000 MPN
1960 -- 158,000 "
1961 -- 230,000 "

International Joint Commission

1961 samples collected the first part of the year from DTI Railroad

Bridge--the remainder from West Jefferson Avenue Bridge

*1959 -- 43,000 MPN
*1960 -- 58,000 "
1961 -- 330,000 "

*Collected from DTI Railroad Bridge only.
Values low due to Detroit River flow through old arm of Rouge.

**REPORT SPECTACULAR CATCHES** Detroit News 3/4/62

# Lake Erie Perch Are Biting

If you want to try fishing for perch in Lake Erie, off Monroe County, where the catches are reportedly spectacular, Conservation Officer John Minick recommends you get out before 10 a.m. or after 2 p.m.

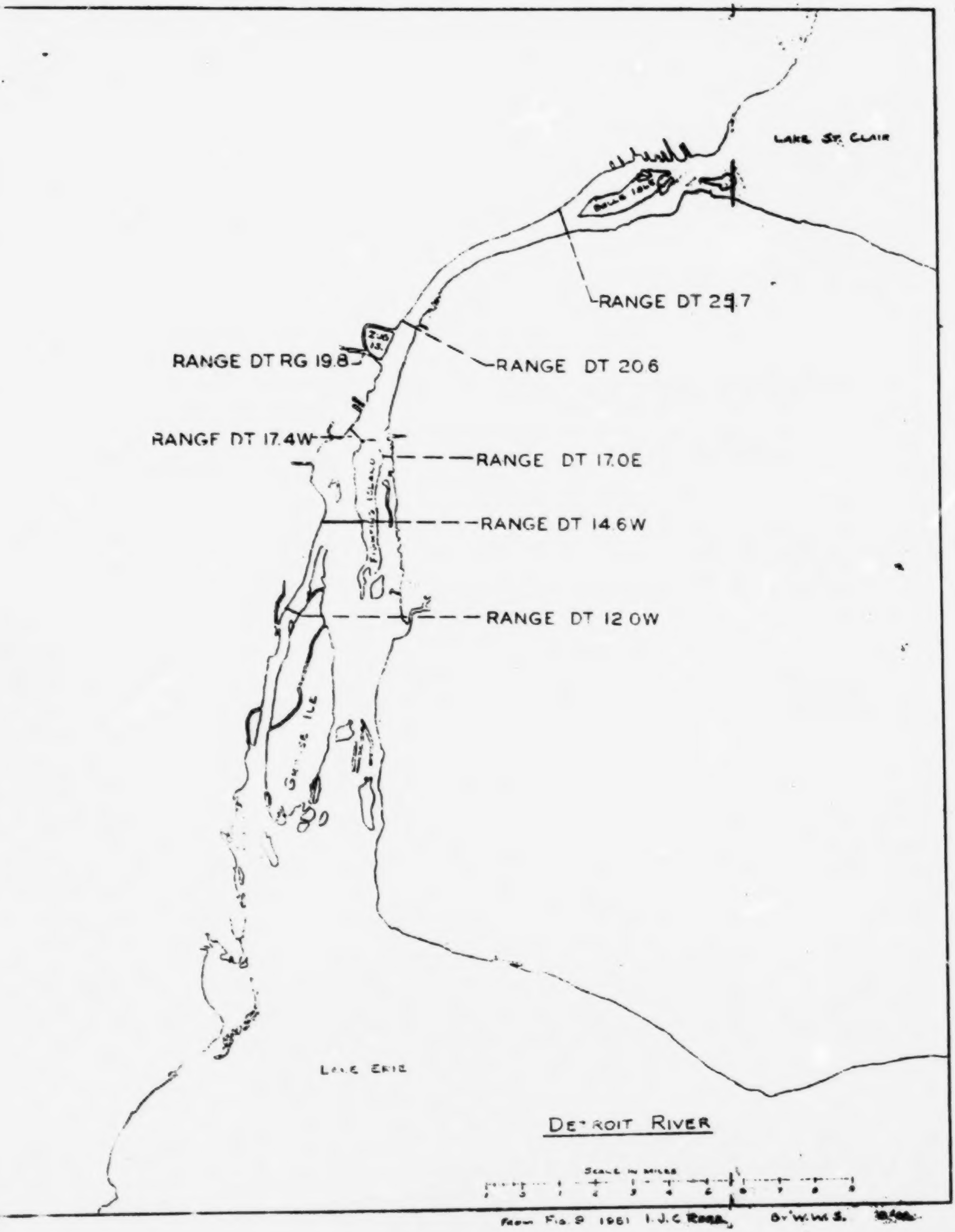
Ice fishermen on the shelf of ice extending in some places for miles offshore have been hauling in 25 to 35 perch apiece, averaging 7½ or 8 inches long, for the past couple of weeks, Minick reports.

A standard ice rod, monofilament line and a good supply of minnows for bait are all you'll need, he adds. He advises against driving on the ice because of cracks and weak spots which are developing. Minick recommends walking out from shore at Luna Pier, the landings south of Bolles Harbor, Avalon Beach or Sterling State Park.

Spud a hole almost anywhere, he says, and you ought to be catching good sized perch before many minutes have gone by. Minick, however, urges fishermen, even those on foot, to exercise extreme caution watching out for cracks and being on guard against being caught on a floe that might break off and float out into the lake.

449R

EXHIBIT 4.5

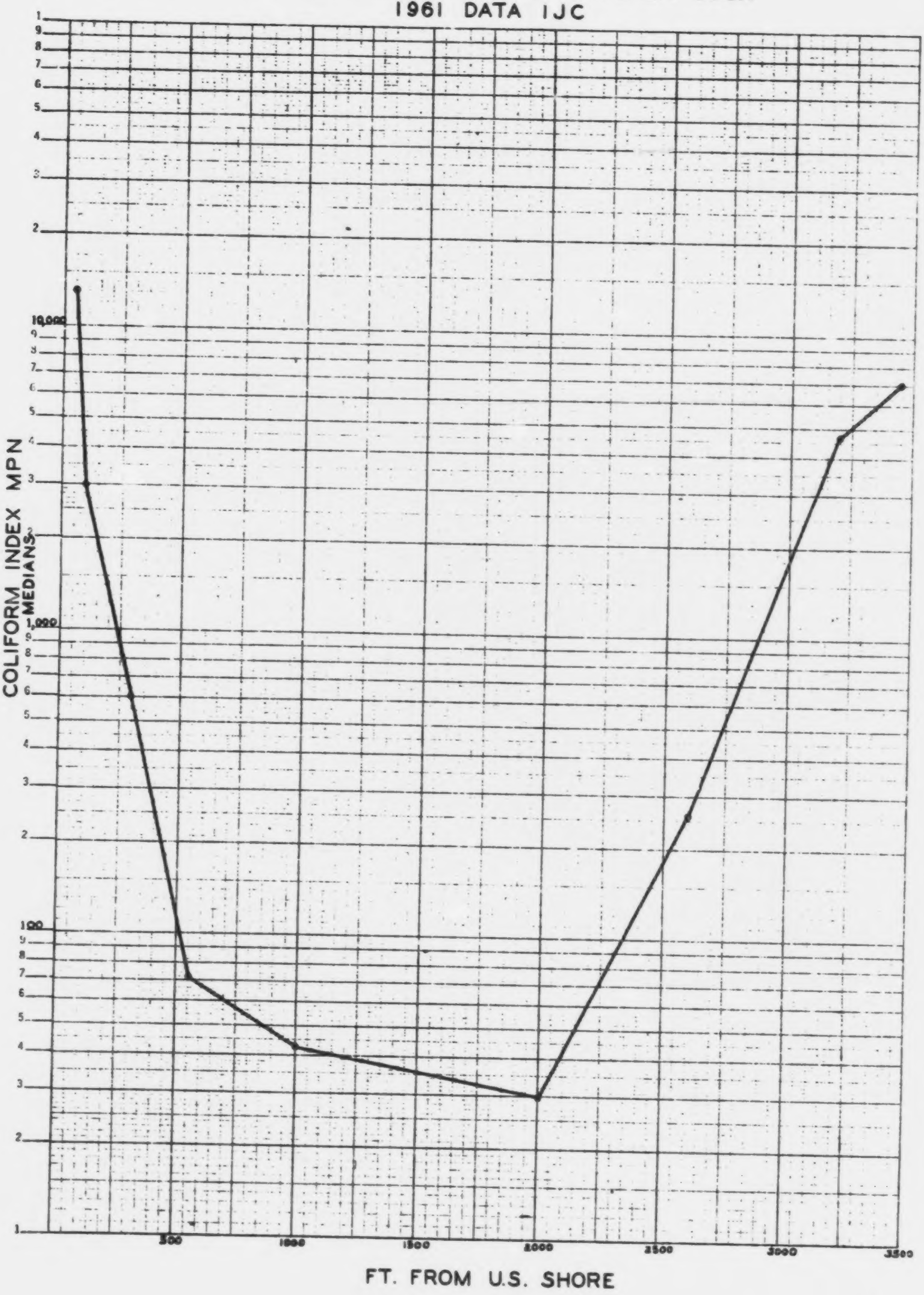

LAKE ST. CLAIR
BELLE ISLE
RANGE DT 25.7
ZUG IS.
RANGE DT RG 19.8
RANGE DT 20.6
RANGE DT 17.4W
RANGE DT 17.0E
RANGE DT 14.6W
FIGHTING ISLAND
RANGE DT 12.0W
GROSSE ILE
LAKE ERIE
DETROIT RIVER
SCALE IN MILES

FROM FIG. 9 1961 I.J.C. REPO. BY W.W.S.

4495

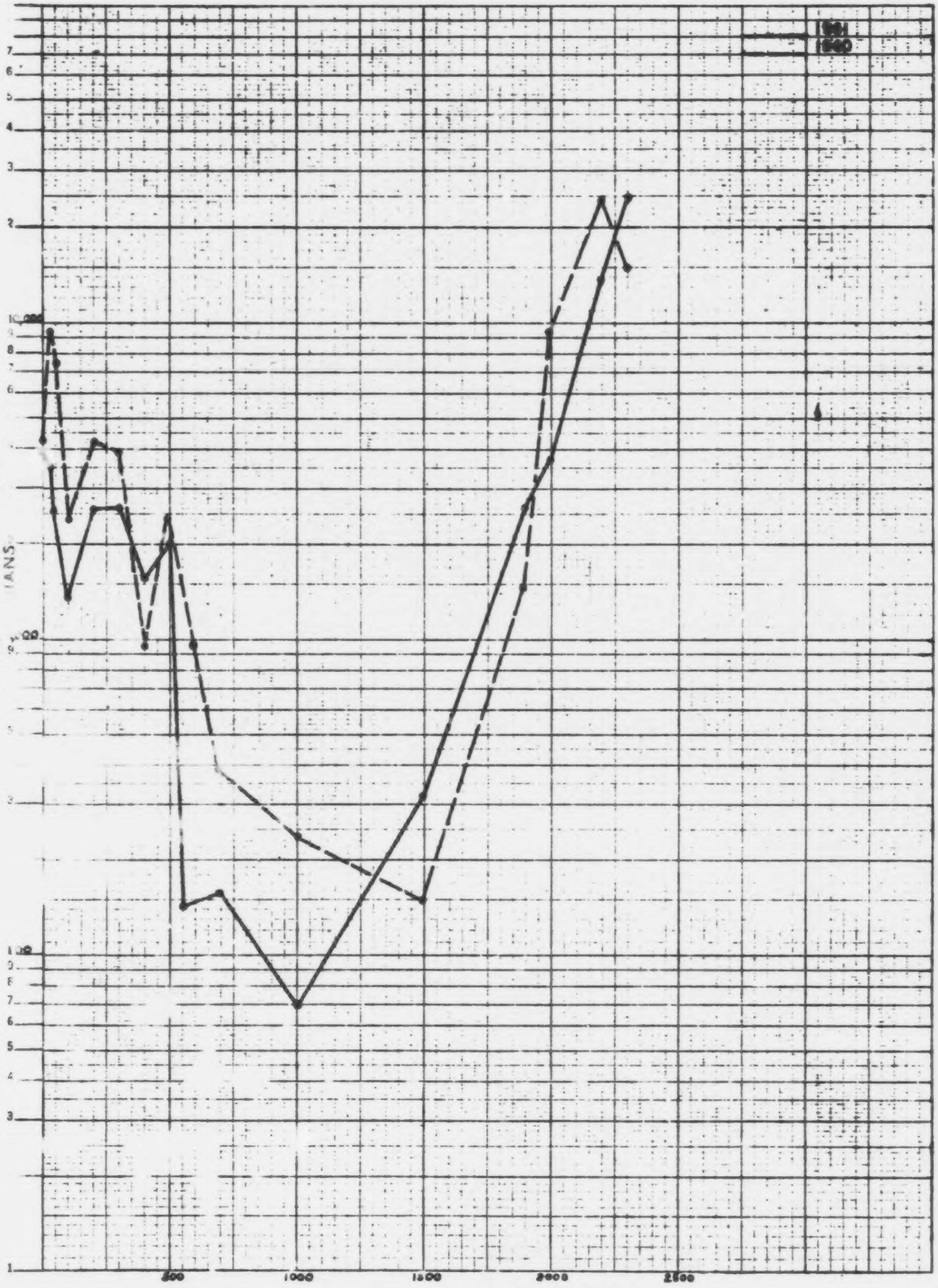
RANGE DT 25.7

## U.S. ENGINEERS TO HIRAM WALKER DOCK
## 1961 DATA IJC



RANGE DT.20.8

DET. ED. CO. DELRAY DOCK TO C.I.L. DOCK WINDSOR
IJC DATA

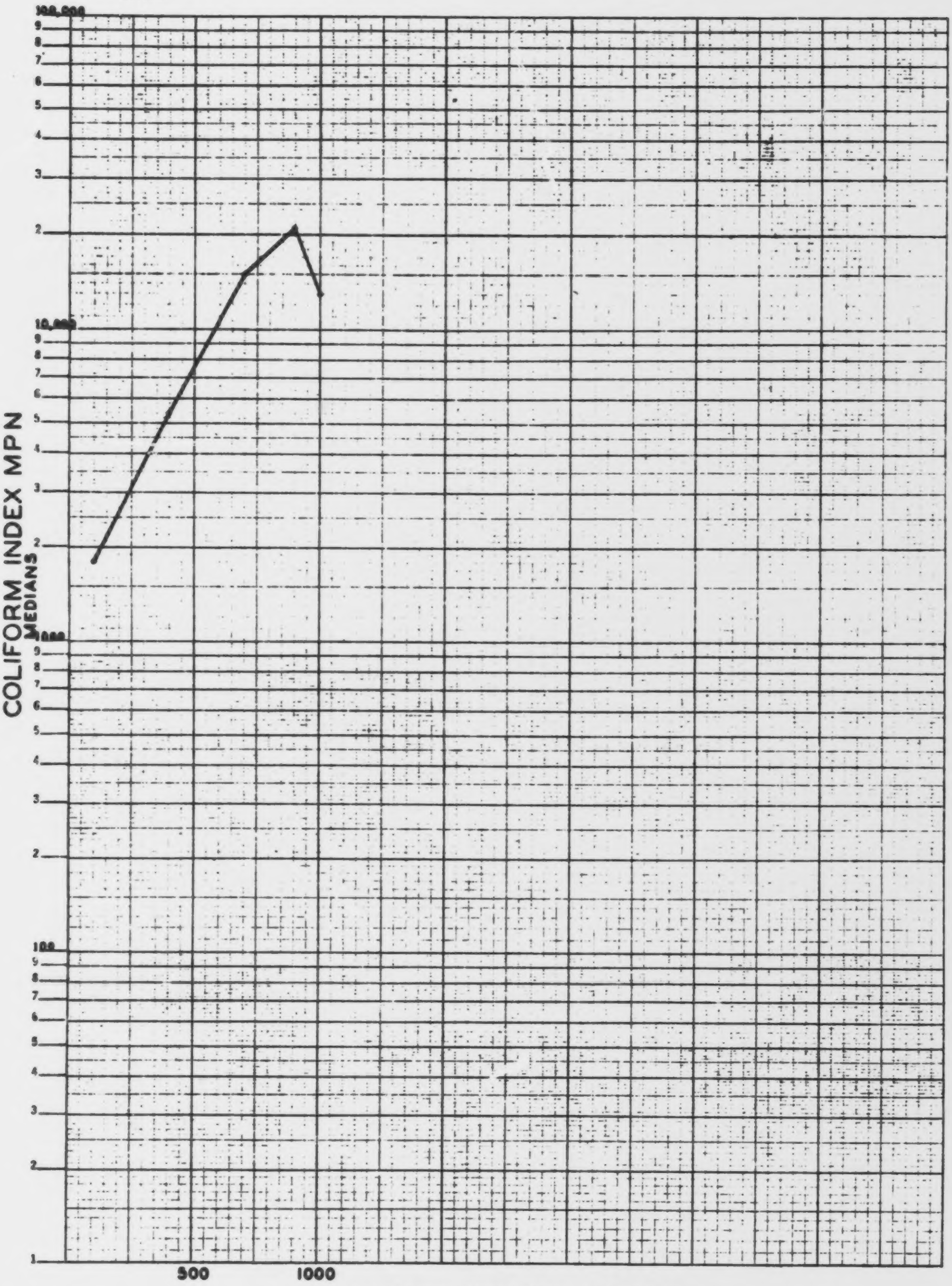


Reproduced from
best available copy.

449 u

RANGE 17.0E
I.J.C.

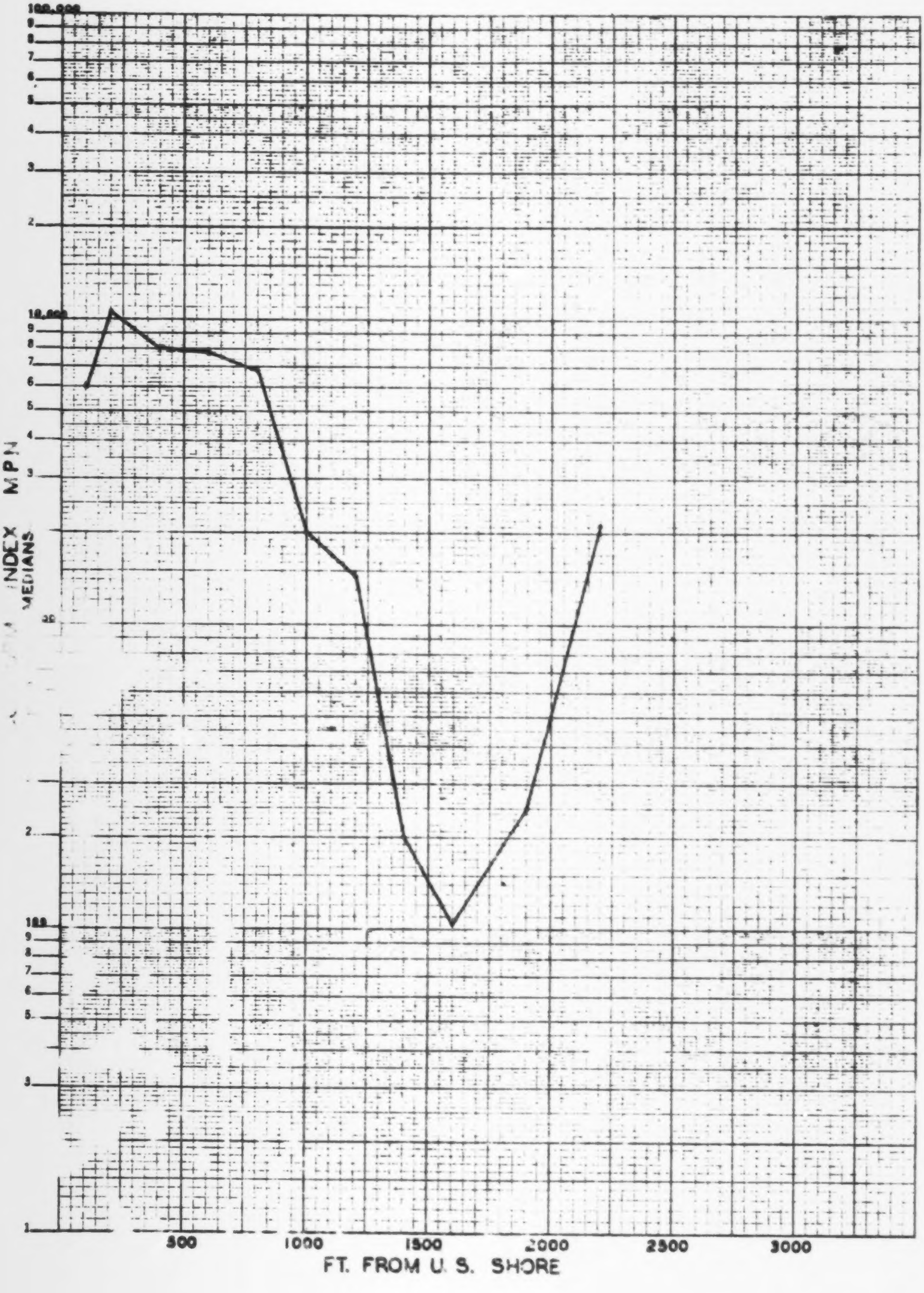
## FIGHTING ISLAND TO CANADA



449 V

RANGE DT 17.4 W
I.J.C.

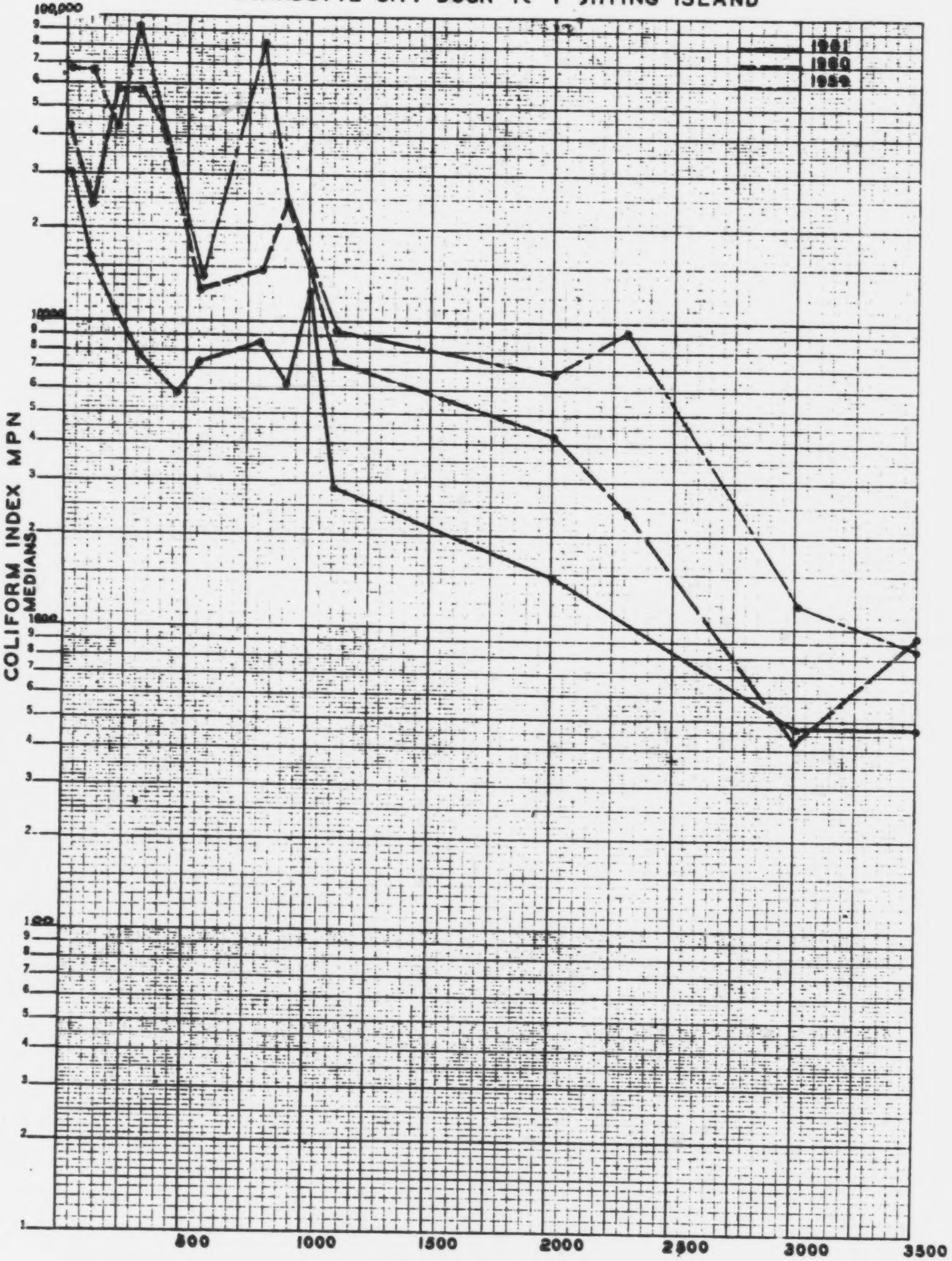
## ECORSE LIGHT TO HD. FIGHTING ISLAND



449 W

RANGE DT 14.6W

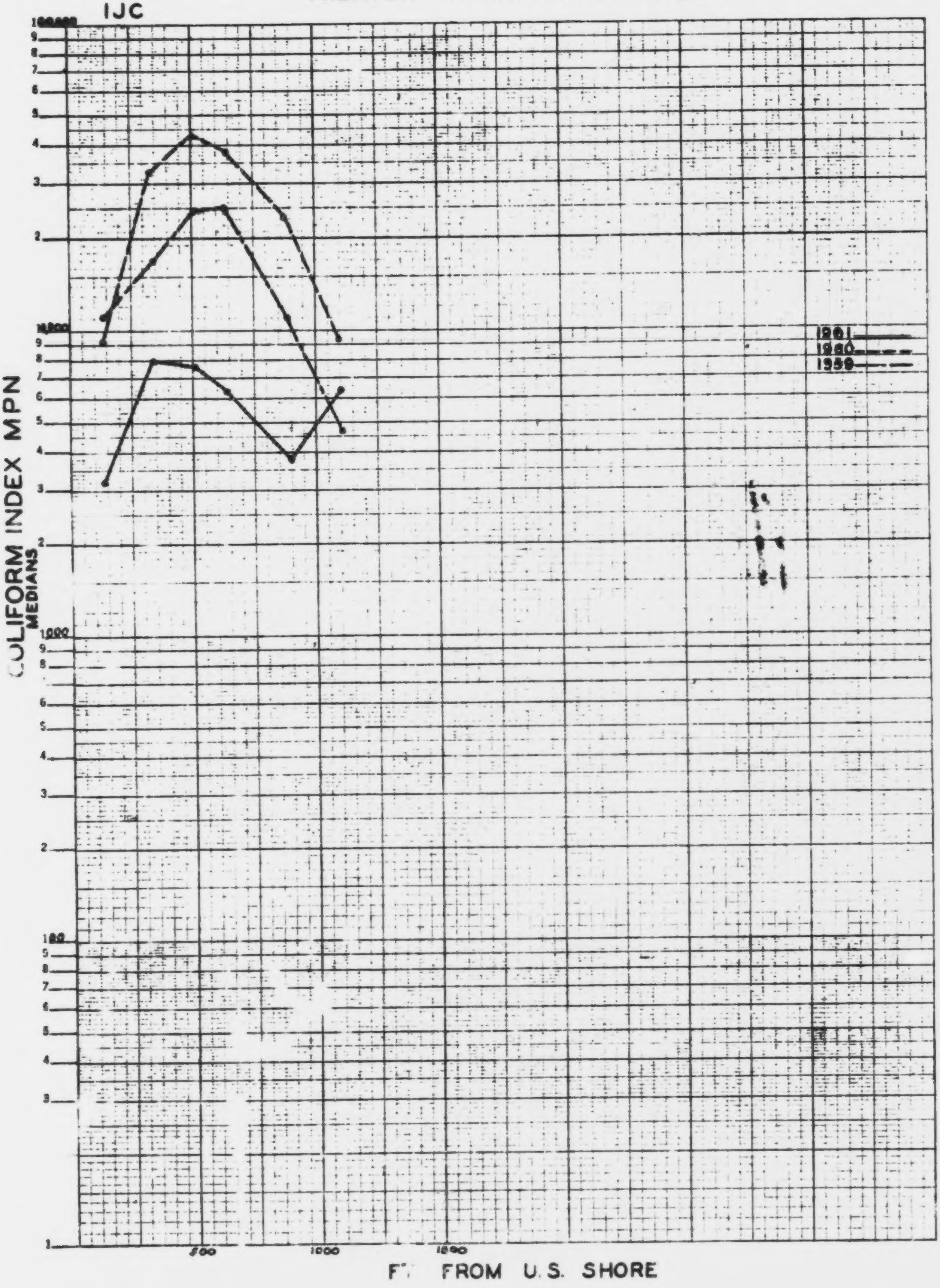
## WYANDOTTE CITY DOCK TO FIGHTING ISLAND



**RANGE DT 12.0 W**

**IJC**

## TRENTON CHANNEL TOLL BRIDGE



4494

## Special Compilation of Operating Data -- Detroit Sewage Treatment Plant

| | | Sewage Pumped MGD | | Temperature of Tank Effluent | Biochemical Oxygen Demand | | |
|---|---|---|---|---|---|---|---|
| | | Arith. Mean | Stat. Mean | | Influent ppm | Effluent ppm | % Reduction |
| 1959 | January | 533.3 | | 52 | 128.0 | 95.4 | 25.5 |
| | February | 583.0 | | 51 | 101.6 | 77.0 | 24.2 |
| | March | 575.3 | | 51 | 97.3 | 72.6 | 25.4 |
| | April | 540.2 | | 56 | 103.2 | 69.4 | 30.5 |
| | May | 626.3 | | 63 | 108.1 | 64.9 | 40.0 |
| | June | 636.9 | 635 | 71 | 104.8 | 63.6 | 39.3 |
| | July | 642.3 | 646 | 76 | 106.6 | 63.8 | 40.2 |
| | August | 632.1 | 635 | 78 | 82.9 | 53.0 | 36.1 |
| | September | 619.3 | 617 | 75 | 96.9 | 54.1 | 44.2 |
| | October | 610.8 | 601 | 67 | 108.0 | 65.3 | 39.5 |
| | November | 579.4 | 569 | 59 | 100.5 | 68.2 | 32.1 |
| | December | 649.2 | 628 | 55 | 112.0 | 72.3 | 35.4 |
| 1960 | January | 629.5 | 595 | 52 | 108.5 | 73.6 | 32.2 |
| | February | 592.8 | 584 | 50 | 107.0 | 78.4 | 26.7 |
| | March | 588.6 | 594 | 50 | 115.3 | 86.3 | 25.2 |
| | April | 602.0 | 596 | 55 | 119.8 | 79.6 | 33.6 |
| | May | 614.8 | 606 | 62 | 128.2 | 83.2 | 35.1 |
| | June | 670.9 | 673 | 67 | 100.7 | 59.1 | 41.3 |
| | July | 586.8 | 589 | 74 | 101.5 | 64.8 | 36.2 |
| | August | 618.1 | 628 | 75 | 101.2 | 66.0 | 34.8 |
| | September | 576.1 | 572 | 75 | 114.4 | 76.4 | 33.2 |
| | October | 542.3 | 546 | 68 | 107.9 | 77.2 | 28.5 |
| | November | 550.2 | 544 | 61 | 111.5 | 82.9 | 24.5 |
| | December | 512.5 | 517 | 55 | 132.9 | 91.6 | 31.1 |
| 1961 | January | 541.8 | 540 | 50 | 131.5 | 90.4 | 31.3 |
| | February | 592.1 | 576 | 50 | 145.4 | 97.0 | 33.3 |
| | March | 551.8 | 552 | 51 | 102.9 | 76.8 | 25.4 |
| | April | 647.7 | 629 | 52 | 115.1 | 70.6 | 38.7 |
| | May | 619.1 | 611 | 60 | 101.9 | 67.7 | 33.6 |
| | June | 578.0 | 568 | 67 | 115.5 | 68.6 | 40.6 |
| | July | 575.8 | 568 | 73 | 86.9 | 60.1 | 30.8 |
| | August | 601.4 | 599 | 76 | 78.3 | 54.9 | 29.9 |
| | September | 603.0 | 602 | 75 | 93.8 | 59.3 | 36.8 |
| | October | 504.3 | 500 | 69 | 123.6 | 69.7 | 43.6 |
| | November | 523.5 | 495 | 64 | 125.7 | 74.0 | 41.1 |
| | December | 507.7 | 496 | 58 | 124.0 | 84.8 | 29.8 |
| 1962 | January | 546.5 | 516 | 53 | 134.4 | 81.9 | 39.7 |
| | February | 549.1 | 547 | 53 | 136.1 | 86.6 | 34.3 |

4492

| Effluent - 1000 lbs. | | Suspended Solids | | | |
|---|---|---|---|---|---|
| Arith. Mean | Stat. Mean | Influent ppm | Effluent ppm | % Reduction | Effluent Arith. Mean - 1000 lbs. |
| | | 236.4 | 104.2 | 43.2 | |
| | | 204.1 | 126.0 | 38.3 | |
| | | 234.2 | 124.6 | 46.8 | |
| | | 259.0 | 119.8 | 53.8 | |
| | | 271.2 | 113.0 | 58.3 | |
| 338 | 335 | 237.2 | 109.2 | 54.0 | 588 |
| 348 | 340 | 235.3 | 111.6 | 52.6 | 603 |
| 285 | 290 | 206.1 | 98.3 | 52.3 | 519 |
| 277 | 273 | 204.9 | 108.0 | 47.3 | 561 |
| 343 | 322 | 196.6 | 98.9 | 49.7 | 508 |
| 335 | 321 | 167.9 | 95.1 | 43.4 | 472 |
| 391 | 395 | 197.4 | 107.5 | 45.5 | 594 |
| 378 | 371 | 202.9 | 110.3 | 45.6 | 598 |
| 392 | 385 | 197.0 | 117.0 | 40.6 | 589 |
| 423 | 416 | 209.3 | 123.1 | 41.2 | 605 |
| 399 | 410 | 277.1 | 133.8 | 51.7 | 680 |
| 431 | 429 | 272.5 | 126.6 | 53.5 | 651 |
| 332 | 342 | 245.5 | 100.2 | 59.2 | 562 |
| 320 | 325 | 187.1 | 94.0 | 49.8 | 465 |
| 340 | 346 | 207.9 | 94.8 | 54.4 | 492 |
| 366 | 369 | 199.6 | 102.8 | 48.5 | 491 |
| 347 | 350 | 209.6 | 117.2 | 44.1 | 532 |
| 384 | 376 | 224.9 | 108.3 | 51.9 | 495 |
| 394 | 392 | 214.4 | 116.0 | 45.9 | 496 |
| 399 | 406 | 198.1 | 107.0 | 46.0 | 486 |
| 481 | 472 | 314.8 | 158.8 | 49.6 | 814 |
| 358 | 350 | 235.0 | 122.9 | 47.7 | 575 |
| 375 | 358 | 261.3 | 123.0 | 52.9 | 677 |
| 346 | 312 | 206.8 | 102.3 | 50.5 | 537 |
| 332 | 328 | 246.8 | 101.9 | 58.7 | 489 |
| 290 | 276 | 180.9 | 98.7 | 45.4 | 478 |
| 274 | 283 | 182.4 | 93.9 | 48.5 | 473 |
| 296 | 297 | 210.9 | 97.3 | 53.9 | 491 |
| 293 | 303 | 229.7 | 101.3 | 55.9 | 427 |
| 314 | 315 | 285.4 | 136.9 | 52.0 | 617 |
| 361 | 354 | 228.7 | 128.2 | 43.9 | 566 |
| 381 | 344 | 258.8 | 140.5 | 45.1 | 678 |
| 402 | 394 | 241.9 | 133.0 | 45.0 | 622 |

*Does not include grit and screenings

**Special Compilation of Operating Data -- Detroit Sewage Treatment Plant** (Contd.)

| | | Sedimentation Tanks | | Chlorine Demand ppm | Chlorine Applied ppm | Chlorine Residual ppm |
|---|---|---|---|---|---|---|
| | | Number in Service | Detention Time - Hrs. | | | |
| 1959 | January | 7.0 | 0.91 | 3.94 | 3.02 | 0.38 |
| | February | 7.9 | .95 | 3.33 | 2.67 | .60 |
| | March | 9.1 | 1.10 | 2.76 | 2.40 | .77 |
| | April | 8.7 | .94 | 2.79 | 2.43 | .56 |
| | May | 6.4 | .72 | 3.14 | 2.46 | .33 |
| | June | 5.2 | .57 | 4.48 | 3.44 | .26 |
| | July | 5.5 | .59 | 5.11 | 4.16 | .39 |
| | August | 6.0 | .66 | 4.60 | 3.74 | .36 |
| | September | 6.1 | .69 | 4.15 | 3.60 | .44 |
| | October | 6.2 | .70 | 3.74 | 3.45 | .39 |
| | November | 7.7 | .93 | 3.76 | 3.58 | .40 |
| | December | 8.8 | .94 | 3.59 | 3.26 | .44 |
| 1960 | January | 9.3 | 1.02 | 3.60 | 3.38 | .66 |
| | February | 8.3 | .98 | 3.69 | 3.13 | .67 |
| | March | 8.6 | 1.01 | 4.03 | 2.90 | .61 |
| | April | 7.9 | .92 | 4.39 | 3.40 | .71 |
| | May | 7.1 | .81 | 4.70 | 3.65 | .50 |
| | June | 6.8 | .70 | 4.14 | 3.41 | .33 |
| | July | 6.4 | .76 | 5.69 | 4.68 | .11 |
| | August | 6.0 | .68 | 5.98 | 5.23 | .03 |
| | September | 6.1 | .73 | 6.11 | 5.15 | .38 |
| | October | 6.9 | .89 | 5.39 | 4.77 | .42 |
| | November | 7.5 | .96 | 4.79 | 3.81 | .17 |
| | December | 5.7 | .77 | 3.65 | 3.31 | .14 |
| 1961 | January | 6.8 | .87 | 3.29 | 3.12 | .30 |
| | February | 6.6 | .71 | 3.54 | 3.19 | .15 |
| | March | 5,8 | .73 | 3.14 | 2.87 | .14 |
| | April | 7.1 | .77 | 3.02 | 2.85 | .14 |
| | May | 7.2 | .85 | 3.25 | 3.13 | .07 |
| | June | 6.6 | .80 | 5.19 | 4.34 | .003 |
| | July | 7.3 | .88 | 5.84 | 4.74 | .01 |
| | August | 8.2 | .95 | 6.31 | 5.09 | .12 |
| | September | 7.8 | .90 | 5.98 | 4.90 | .44 |
| | October | 6.1 | .84 | 6.79 | 5.23 | .34 |
| | November | 7.1 | .95 | 5.54 | 4.47 | .27 |
| | December | 7.2 | 1.00 | 4.85 | 4.46 | .21 |
| 1962 | January | 6.9 | .88 | 3.50 | 3.39 | .38 |
| | February | 7.1 | .93 | 3.65 | 3.50 | .33 |

449ff

Coliform Indices, MPN, x 1000

| Tank Effluent | Final Effluent: Geom. Mean | Final Effluent: Stat. Mean | Final Effluent: Adjusted Geom. Mean | Final Effluent: Adjusted Median |
|---|---|---|---|---|
| 3,630 | 443 | | | |
| 1,589 | 238.6 | | | |
| 1,970 | 122 | | | |
| 2,880 | 71.0 | | | |
| 4,564 | 46.8 | | | |
| 7,620 | 1,164 | 1,100 | | |
| 11,200 | 240 | 270 | | |
| 15,600 | 782 | 840 | | |
| 16,890 | 1,462 | 1,790 | | |
| 25,600 | 578 | 700 | | |
| 7,819 | 963.6 | 1,030 | | |
| 3,615 | 583.0 | 661 | | |
| 2,470 | 200 | 199 | | |
| 2,790 | 274 | 271 | | |
| 2,710 | 249 | 255 | | |
| 3,680 | 250 | 260 | | |
| 7,200 | 581 | 560 | | |
| 11,120 | 586.4 | 600 | | |
| 16,300 | 762 | 790 | | |
| 20,100 | 720 | 740 | | |
| 16,700 | 281 | 240 | | |
| 12,940 | 289 | 286 | | |
| 9,950 | 1,373 | 1,490 | 59.2 | 74 |
| 7,407 | 1,938 | 2,490 | 166 | 196 |
| 5,930 | 1,450 | 1,530 | 74.6 | 89 |
| 4,860 | 1,470 | 1,480 | 69.1 | 85 |
| 4,560 | 971 | 950 | 36 | 44.8 |
| 4,180 | 805 | 848 | 45 | 30 |
| 6,390 | 1,625 | 1,125 | 51.4 | 77 |
| 11,800 | 2,190 | 2,260 | 150 | 169 |
| 18,600 | 2,270 | 2,250 | 242 | 260 |
| 23,900 | 774.4 | 1,000 | 96.9 | 109 |
| 19,300 | 153 | 150 | | |
| 15,700 | 592 | 543 | 123 | 133 |
| 10,040 | 107 | 120 | | |
| 6,630 | 67.7 | 70.7 | | |
| 4,330 | 37.3 | 37.3 | | |
| 4,920 | 30.9 | 36.8 | | |

449CC

Exhibit 4.6

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449 aa

Exhibit 4.7

# EXCERPTS FROM
# MINUTES OF MEETING IN LANSING, MICHIGAN
# JULY 22, 1957 - 10:30 AM to 12 NOON

PLACE - Michigan Dept. of Health Bldg. - Office of W. Shephard

PRESENT:

W. R. Shephard - Director, Division of Engrg., Mich. Dept. of Health
D. M. Pierce - Division of Engineering, " " " "
G. Remus - General Manager & Chief Engineer, Detroit Water Supply
V. Anderson - Engineer, " " "
Not Present - C. Palmer of the D.P.W. - away on vacation

SUBJECT OF MEETING:

Detroit Sewage Treatment Plant - Enlargement Program. Particularly, the overflow channel to the Rouge River. One copy of the Enlargement Program was left with Mr. Pierce (Copy #3)

PURPOSE OF MEETING:

The purpose of the meeting was to get, at this time, tentative approval of the Enlargement Program so it could be presented to the Mayor or Council.

DISCUSSION:

No objection was raised to the program as a whole, but Mr. Pierce wants more information about the overflow channel to the Rouge, such as how much flow and how often would the channel carry water to the Rouge, before he commits himself. This information will be sent to him.

Mr. Shephard then said that no one could object to our general enlargement program, especially since we were trying to improve the River conditions.

CONCLUSIONS:

Mr. Shephard will write a letter in a few days outlining his view on the program.
Mr. Pierce wants to study the Rouge overflow outlet channel a little more before committing himself.

449 ee

**MICHIGAN DEPARTMENT OF HEALTH**
LANSING 4, MICHIGAN

March 14, 1958

Mr. Gerald Remus
General Manager
Department of Water Supply
735 Randolph Street
Detroit 26, Michigan

Dear Mr. Remus:

Detroit Sewage Treatment Plant
Enlargement Program - Auxiliary Rouge Outlet

This letter is written in response to yours of March 11.

The information supplied in your letter, and particularly on the second page thereof, confirms and further elaborates upon each of the conditions outlined in our letter of February 28 as a basis for approval of the proposed auxiliary outfall to the Rouge River. You may therefore consider this as a formal approval of the principles outlined with respect to this proposal. We shall look forward with interest to receiving the plans and specifications for this work.

In your letter, you provide some information on the expected characteristics of the effluent from the Detroit sewage treatment plant after intermediate treatment facilities are installed. We do not have sufficient information before us to know whether these ranges of quality would provide sufficient pollution control at the time installed or whether these ranges may reasonably be expected to be produced by the processes you have in mind. As expressed in our conference on July 22 and subsequently in our discussions, we would be satisfied at this time to defer decision on the specific manner of attaining adequate pollution control by additional treatment facilities until you are ready to make specific plans for design of those facilities. There should be no difficulty in arriving at a decision with respect to degree of treatment required and the best manner of attaining that objective at that time.

Very truly yours,

Donald M. Pierce, Chief
Section of Sewerage and Sewage Treatment
Division of Engineering

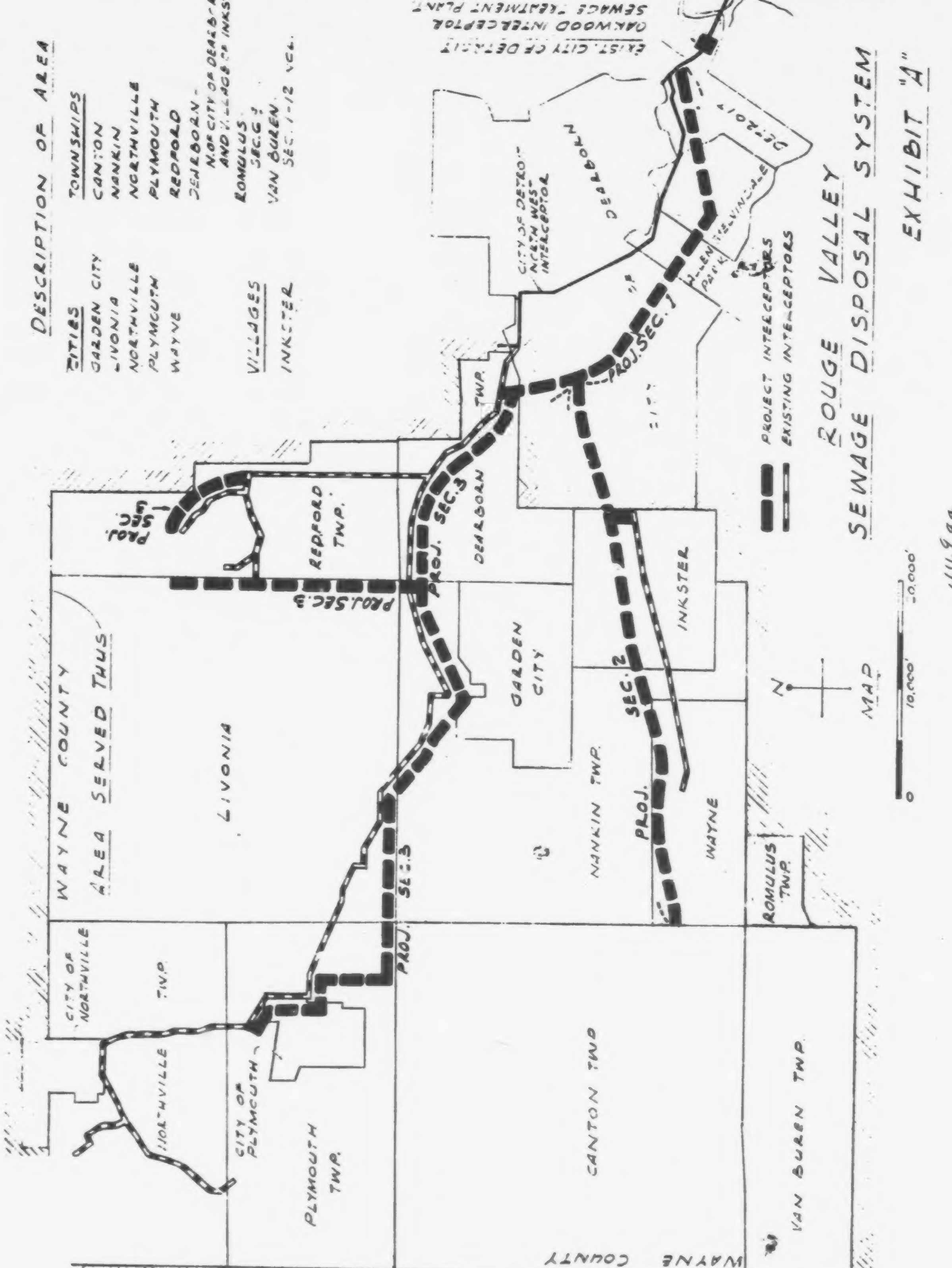
pl
cc: Mr. Clyde Palmer

Exhibit 4.8

## FACILITIES UNDER CONSTRUCTION OR ABOUT TO GO IN SERVICE

| | | | |
|---|---|---|---|
| 1962 | - | Northeast Interceptor District, Wayne County System Increase capacity of existing interceptor, three Macomb and three Wayne County communities ---------------------------- | $ 700,000.00 |
| 1961-62 | - | Centerline Interceptor --------------------- | 1,300,000.00 |
| 1962 | - | Dearborn West Side Sewage Treatment Plant connected to Detroit ----------------------- | 296,000.00 |
| 1962-63 | - | Rouge Valley Interceptors------------------ | 18,000.00 |
| 1962-63 | - | Downriver Interceptors--------------------- | 18,300.00 |
| | | | $38,596,000.00 |

Exhibit 4.9



ROUGE VALLEY
SEWAGE DISPOSAL SYSTEM
EXHIBIT "A"
DESCRIPTION OF AREA
CITIES
GARDEN CITY
LIVONIA
NORTHVILLE
PLYMOUTH
WAYNE
VILLAGES
INKSTER
TOWNSHIPS
CANTON
NANKIN
NORTHVILLE
PLYMOUTH
REDFORD
DEARBORN - N. OF CITY OF DEARBORN AND VILLAGE OF INKSTER
ROMULUS SEC. 6
VAN BUREN SEC. 1-12 INCL.
WAYNE COUNTY
AREA SERVED THUS
PROJECT INTERCEPTORS
EXISTING INTERCEPTORS
MAP
0
10,000'
20,000'
N
EXIST. CITY OF DETROIT OAKWOOD INTERCEPTOR SEWAGE TREATMENT PLANT
CITY OF DETROIT NORTH WEST INTERCEPTOR
DEARBORN
DETROIT
ALLEN PARK
MELVINDALE
PROJ. SEC. 1
PROJ. SEC. 2
PROJ. SEC. 3
PROJ. SEC. 3
PROJ. SEC. 3
PROJ. SEC. 3
DEARBORN TWP.
REDFORD TWP.
GARDEN CITY
INKSTER
NANKIN TWP.
WAYNE
ROMULUS TWP.
LIVONIA
CITY OF NORTHVILLE
TWP.
NORTHVILLE
CITY OF PLYMOUTH
PLYMOUTH TWP.
CANTON TWP.
VAN BUREN TWP.
WAYNE COUNTY

4499

### DIVISION OF COST
### ROUGE VALLEY SEWAGE DISPOSAL SYSTEM
### ESTIMATED POPULATION AND MAXIMUM RATE OF SEWAGE FLOW

| Municipality | | | Ult. Pop. to Interceptor | Total c.f.s. | Project Sections 1, 2 & 3 Division of Net Cost | |
|---|---|---|---|---|---|---|
| Type | Name | | | | Cost | % |
| City | Livonia | | 192,350 | 77.94 | $ 4,334,489.16 | 25.777 |
| Twp. | Nankin | (1). | 154,000 | 62.90 | 4,265,401.89 | 25.367 |
| Twp. | Redford | | 80,000 | 39.00 | 1,281,569.61 | 7.622 |
| Twp. | Dearborn (N) | | 55,000 | 22.00 | 993,754.82 | 5.910 |
| City | Garden City | | 50,000 | 24.40 | 1,247,300.81 | 7.418 |
| City | Plymouth | | 12,000 | 4.80 | 96,942.27 | 0.576 |
| City | Northville | | 9,000 | 3.60 | 178,871.86 | 1.064 |
| Twp. | Northville | (1) | 4,000 * | 1.60 | 46,303.61 | 0.275 |
| Twp. | Plymouth | (1) | 24,000 * | 9.60 | 428,530.26 | 2.548 |
| Twp. | Canton | | 30,000 * | 12.00 | 831,624.57 | 4.946 |
| Village | Inkster | | 50,000 | 21.70 | 1,476,958.80 | 8.784 |
| City | Wayne | | 39,000 | 16.20 | 1,102,566.62 | 6.557 |
| Twp. | Van Buren (N) | | 8,000 * | 3.20 | 217,759.84 | 1.295 |
| City | Detroit (for D. H. O. C.)(2) | | 4,000 | 1.60 | 67,904.96 | 0.404 |
| Twp. | Romulus (NW) | | 9,000 | 3.60 | 245,020.92 | 1.457 |
| | TOTALS: | | 720,350 | 304.14 | $16,815,000.00 | 100.000 |

* Part of Ultimate
(1) Except Institutions
(2) Equivalent Population
(3) Total of Project Sections 1, 2 & 3
Adjusted to $16,815,000

**MUNICIPALITIES**
**SUMMARY**
**PROJECT SECTIONS 1, 2 and 3**

EXHIBIT "B"
Sheet 1 of 4

449kk

449ee

# DIVISION OF COST
# ROUGE VALLEY SEWAGE DISPOSAL SYSTEM
# ESTIMATED POPULATION AND MAXIMUM RATE OF SEWAGE FLOW

| Municipality |  |  | Ult. Pop. to | Total | Exist. Conn. to | Division of New Facilities |  |
|---|---|---|---|---|---|---|---|
| Type | Name |  | Interceptor | c.f.s. | Detroit | c.f.s. | Cost |
| City | Livonia |  | 192,350 | 77.94 | 25.47 | 52.47 | $1,663,080.02 |
| Twp. | Nankin | (1) | 154,000 | 62.90 | 4.78 | 58.12 | 1,842,196.65 |
| Twp. | Redford |  | 80,000 | 39.00 | 26.10 | 12.90 | 408,899.13 |
| Twp. | Dearborn (N) |  | 55,000 | 22.00 | 10.65 | 11.35 | 359,764.16 |
| City | Garden City |  | 50,000 | 24.40 | 9.63 | 14.77 | 468,167.27 |
| City | Plymouth |  | 12,000 | 4.80 | 4.13 | 0.67 | 21,214.06 |
| City | Northville |  | 9,000 | 3.60 | 1.50 | 2.10 | 66,558.19 |
| Twp. | Northville | (1) | 4,000 * | 1.60 | 1.16 | 0.44 | 13,924.00 |
| Twp. | Plymouth | (1) | 24,000 * | 9.60 | 4.72 | 4.88 | 154,694.95 |
| Twp. | Canton |  | 30,000 * | 12.00 | 0.61 | 11.39 | 361,003.47 |
| Village | Inkster |  | 50,000 | 21.70 | - | 21.70 | 687,816.60 |
| City | Wayne |  | 39,000 | 16.20 | - | 16.20 | 513,438.50 |
| Twp. | Van Buren (N) |  | 8,000 * | 3.20 | - | 3.20 | 101,404.65 |
| City | Detroit (for D.H.O.C.) | (2) | 4,000 | 1.60 | 0.84 | 0.76 | 24,088.87 |
| Twp. | Romulus (NW) |  | 9,000 | 3.60 | - | 3.60 | 114,089.35 |
|  | TOTALS: |  | 720,350 | 304.14 | 89.59 | 214.55 | $6,800,339.87 |

* Part of Ultimate
(1) Except Institutions
(2) Equivalent Population

MUNICIPALITIES
PROJECT SECTION 1

EXHIBIT "B"
Sheet 2 of 4

## DIVISION OF COST
## ROUGE VALLEY SEWAGE DISPOSAL SYSTEM
## ESTIMATED POPULATION AND MAXIMUM RATE OF SEWAGE FLOW

| Municipality | | | Ult. Pop. to Interceptor | c. f. s. /1000 | | Division of New Facilities | |
|---|---|---|---|---|---|---|---|
| Type | Name | | | 0.4 | 0.5 | c. f. s. | Cost |
| Twp. | Nankin (S) | (1) | 75,000 | 28.80 | 1.50 | 30.30 | $1,101,976.53 |
| Village | Inkster | | 50,000 | 13.2 | 8.50 | 21.70 | 789,204.31 |
| City | Wayne | | 39,000 | 13.20 | 3.00 | 16.20 | 589,174.48 |
| Twp. | Canton (S) | | 15,000 * | 6.0 | - | 6.00 | 218,215.14 |
| Twp. | Van Buren (N) | | 8,000 * | 3.20 | - | 3.20 | 116,364.35 |
| Twp. | Romulus (NW) | | 9,000 | 3.60 | - | 3.60 | 130,941.87 |
| | TOTALS: | | 196,000 | 68.00 | 13.00 | 81.00 | $2,945,876.68 |

* Part of Ultimate
(1) Except Institutions (Eloise)

MUNICIPALITIES
PROJECT SECTION 2

EXHIBIT "B"
Sheet 3 of 4

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# DIVISION OF COST
# ROUGE VALLEY SEWAGE DISPOSAL SYSTEM
## ESTIMATED POPULATION AND MAXIMUM RATE OF SEWAGE FLOW

| Municipality Type | Municipality Name | | Ult. Pop. to Interceptor | c.f.s./1000 0.4 | c.f.s./1000 0.5 | Total c.f.s. | Credit Exist. $ | M. R. I. c.f.s. | Divisions of New Facilities c.f.s. | Divisions of New Facilities Cost |
|---|---|---|---|---|---|---|---|---|---|---|
| City | Livonia | | 192,350 | 72.94 | 5.0 | 77.94 | 1,089,443.25 | 19.41 | 58.53 | 2,671,591.41 |
| Twp. | Nankin (N) | | 79,000 | 27.60 | 5.0 | 32.60 | 204,686.95 | 3.65 | 28.95 | 1,321,408.07 |
| Twp. | Redford | | 80,000 | 4.00 | 35.0 | 39.00 | 1,116,133.84 | 19.88 | 19.12 | 872,724.37 |
| Twp. | Dearborn (N) | | 55,000 | 22.00 | - | 22.00 | 455,554.61 | 8.11 | 13.89 | 634,032.45 |
| City | Garden City | | 50,000 | 2.40 | 22.00 | 24.40 | 411,726.16 | 7.33 | 17.07 | 779,185.99 |
| City | Plymouth | | 12,000 | 4.80 | - | 4.80 | 176,456.04 | 3.14 | 1.66 | 75,732.28 |
| City | Northville | | 9,000 | 3.60 | - | 3.60 | 63,986.43 | 1.14 | 2.46 | 112,321.19 |
| Twp. | Northville | (1) | 4,000 * | 1.60 | - | 1.60 | 49,685.91 | 0.89 | 0.71 | 32,381.56 |
| Twp. | Plymouth | (1) | 24,000 * | 9.60 | - | 9.60 | 201,835.79 | 3.60 | 6.00 | 273,853.33 |
| Twp. | Canton (N) | | 15,000 * | 6.00 | - | 6.00 | 26,172.43 | 0.47 | 5.53 | 252,440.93 |
| City | Detroit (for D.H.O.C.) | (2) | 4,000 | 1.60 | - | 1.60 | 35,871.09 | 0.64 | 0.96 | 43,818.94 |
| | TOTALS: | | 524,350 | 156.14 | 67.00 | 223.14 | 3,831,552.50 | 68.26 | 154.88 | 7,069,490.52 |

* Part of Ultimate
(1) Except Institutions
(2) Equivalent Population

MUNICIPALITIES
PROJECT SECTION 3

EXHIBIT "B"
Sheet 4 of 4

## DIVISION OF COST
## ROUGE VALLEY SEWAGE DISPOSAL SYSTEM
## ESTIMATED POPULATION AND MAXIMUM RATE OF SEWAGE FLOW

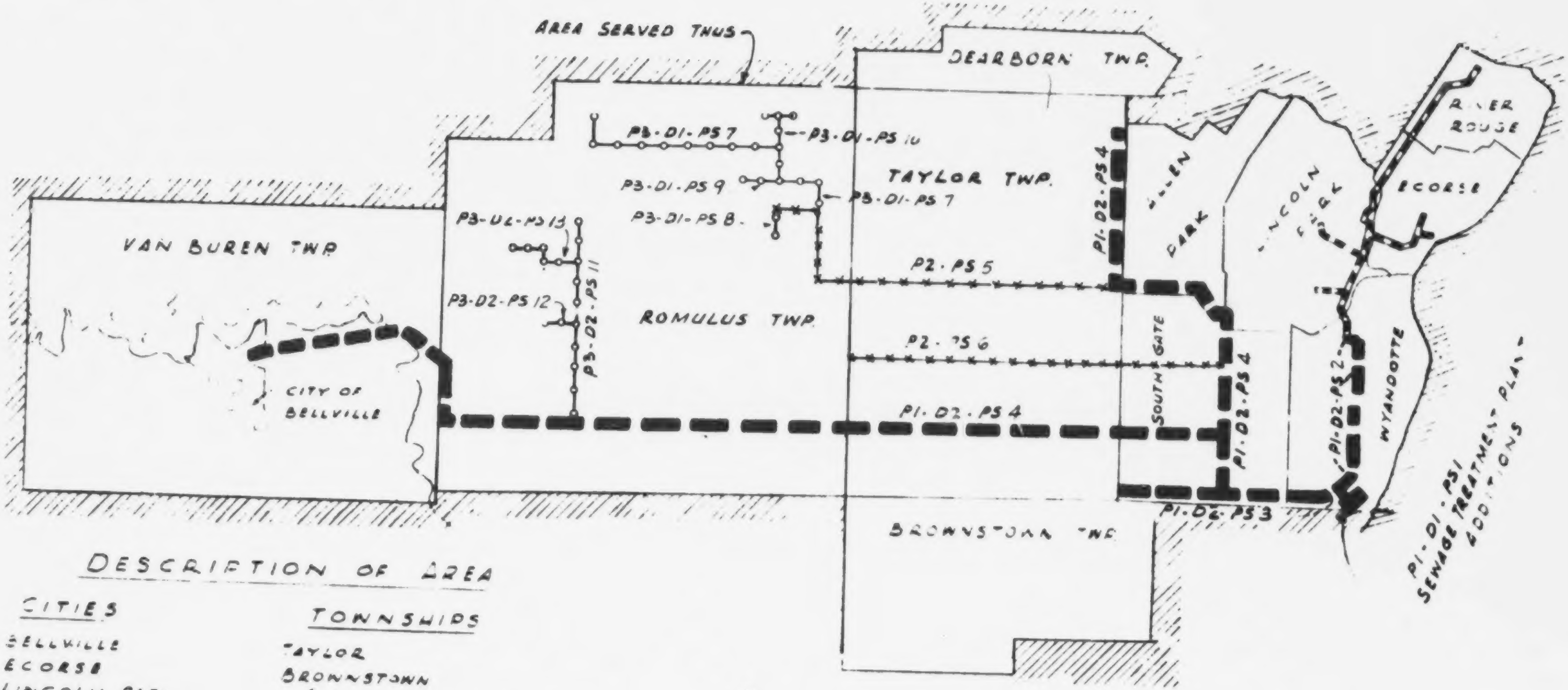
| | PROJECT SECTION 1 | | | PROJECT SECT. 2 | | PROJECT SECTION 3 | | | SUMMARY | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Exist. c. f. s. | New Facilities | | New Facilities | | Exist. c. f. s. | New Facilities | | | |
| | M. R. I. | c. f. s | Cost | c. f. s | Cost | M. R. I. | c. f. s. | Cost | Cost | % |
| Wayne Co. Gen. Hosp. & Infirm. at Eloise (Nankin Twp.) | - | 6.0 | $ 190,197.51 | 6.00 | $ 218,215.14 | - | - | - | $ 408,412.65 | 34,465 |
| Mich. State Hosp. in Northville Twp. | 0.43 | 1.77 | $ 56,101.72 | - | - | 0.33 | 1.87 | $ 85,355.65 | $ 141,457.37 | 11.937 |
| Plymouth State Home & Train. School in Northville Twp. | 0.37 | 0.31 | $ 9,825.72 | - | - | 0.28 | 0.40 | $ 18,257.89 | $ 28,083.61 | 2.370 |
| Other Contrib incl. Mayberry San. & Wayne Co. Train. Sch. | 4.11 | - | - | - | - | 3.13 | - | - | - | - |
| Reserves | - | 7.37 | $ 233,875.12 | 0.90 | $ 32,855.05 | - | 7.45 | $ 340,316.20 | $ 607,046.37 | 51.228 |
| EXHIBIT "C" TOTALS | 4.91 | 15.45 | $ 490,000.07 | 6.90 | $ 251,070.19 | 3.74 | 9.72 | $ 443,929.74 | $ 1,185,000.00 | 100.000 |
| Exhibit "B" Adjust. Totals | 89.59 | 214.55 | $6,800,053.93 | 81.00 | $2,945,752.81 | 68.26 | 154.88 | $7,069,193.26 | $16,815,000.00 | 100.000 |
| Project Totals | 94.50 | 230.00 | $7,290,054.00 | 87.90 | $3,196,823.00 | 72.00 | 164.60 | $7,513,123.00 | $18,000,000.00 | 100.000 |

CONTRIBUTIONS, INSTITUTIONS,
AND RESERVE
PROJECT SECTIONS 1, 2, and 3

EXHIBIT "C"
Sheet 1 of 1

449ll

Exhibit 4.10


AREA SERVED THUS
DEARBORN TWP.
TAYLOR TWP.
VAN BUREN TWP.
ROMULUS TWP.
BROWNSTOWN TWP.
CITY OF BELLVILLE
ALLEN PARK
LINCOLN PARK
RIVER ROUGE
ECORSE
WYANDOTTE
SOUTH GATE
P3-D1-PS7
P3-D1-PS10
P3-D1-PS9
P3-D1-PS7
P3-D1-PS8
P3-D2-PS13
P3-D2-PS12
P3-D2-PS11
P2-PS5
P2-PS6
P1-D2-PS4
P1-D2-PS4
P1-D2-PS4
P1-D2-PS2
P1-D2-PS3
P1-D1-PS1
SEWAGE TREATMENT PLANT
ADDITIONS

## DESCRIPTION OF AREA

CITIES

BELLVILLE
ECORSE
LINCOLN PARK
RIVER ROUGE

SOUTHGATE
WYANDOTTE
ALLEN PARK
(SOUTH OF STATE ST., SOUTHFIELD RD., D.T.&I. R.R., ANNE AVE., ALLEN RD. & THE CITY OF MELVINDALE.

TOWNSHIPS

TAYLOR
BROWNSTOWN
(W½ SEC 2, SECS. 3-10 INCL., W½ SEC 11, NW¼ SEC. 16 N½ SECS. 17 and 18)
DEARBORN
(SOUTH OF CITY OF DEARBORN & VILLAGE OF INKSTER)
ROMULUS
(EXCEPT SEC 6 & W½ SEC. 5)
VAN BUREN
(SEC 13-36 INCL.)

N
MAP
0
10,000
20,000

| | |
|---|---|
| o—o—o—o | PART 3 INTERCEPTORS |
| x—x—x—x | PART 2 INTERCEPTORS |
| ▬ ▬ | PART 1 INTERCEPTORS |
| ═ | EXISTING INTERCEPTORS |

P = CONTRACT PART
D = DIVISION OF PART
PS = PROJECT SECTION

## DOWN RIVER
## SEWAGE DISPOSAL SYSTEM

EXHIBIT "A"

3-1-62

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## DOWN RIVER SEWAGE DISPOSAL SYSTEM, COUNTY OF WAYNE, MICHIGAN
## DIVISION OF COST AND ALLOCATION OF CAPACITY

3/1/62

### PART ONE - SUMMARY

| Area | Division 2 Interceptor Pop. | Division 2 Interceptor c.f.s. | Division 1 Disposal Plant Pop. | Division 1 Disposal Plant c.f.s. | Division One Project Section 1 Cost | Division One Project Section 1 % | Division Two Project Sec. 2, 3 & 4 Cost | Division Two Project Sec. 2, 3 & 4 % | Part One Combined % |
|---|---|---|---|---|---|---|---|---|---|
| Van Buren Twp. (S) | 13,000* | 5.2 | 13,000* | 5.2 | $ 140,656.82 | 2.559 | $ 263,256.94 | 3.071 | 2.871 |
| Belleville | 7,000 | 2.8 | 7,000 | 2.8 | 75,742.51 | 1.378 | 141,710.48 | 1.653 | 1.545 |
| Romulus Twp. | 106,000* | 42.4 | 55,000* | 22.0 | 595,111.90 | 10.827 | 2,146,507.38 | 25.037 | 19.486 |
| Taylor Twp. | 170,000 | 68.0 | 117,500* | 47.0 | 1,271,352.94 | 23.130 | 3,442,490.80 | 40.153 | 33.503 |
| Dearborn Twp. (S) | 25,000 | 10.0 | 25,000 | 10.0 | 270,485.42 | 4.921 | 506,274.54 | 5.905 | 5.521 |
| Southgate | 40,000** | 16.0** | 55,000 | 23.5 | 635,676.47 | 11.565 | 809,996.76** | 9.448** | 10.275 |
| Allen Park (S & SW) | 40,000 | 19.2 | 40,000 | 19.2 | 519,369.39 | 9.449 | 372,015.57 | 4.339 | 6.335 |
| Lincoln Park | 55,000 | 27.5 | 55,000 | 27.5 | 743,903.62 | 13.534 | 432,917.87 | 5.049 | 8.364 |
| Ecorse | 21,000 | 10.5 | 21,000 | 10.5 | 284,006.94 | 5.167 | 165,294.78 | 1.928 | 3.193 |
| River Rouge | 22,000 | 11.0 | 22,000 | 11.0 | 297,528.47 | 5.413 | 173,162.98 | 2.020 | 3.345 |
| Wyandotte | ------- | ----- | 47,000 | 23.5 | 635,676.47 | 11.565 | ------------- | ------- | 4.518 |
| Brownstown (N) | 36,000* | 14.4 | 2,500 | 1.0 | 27,043.05 | 0.492 | 119,817.90 | 1.397 | 1.044 |
|  | 535,000 | 227.0 | 460,000 | 203.2 | $5,496,554.00 | 100.000 | $8,573,446.00 | 100.000 | 100.000 |

* Part of Ultimate
** Southgate (W)

### PART TWO - SUMMARY

**PROJECT SECTION 5** - Estimated Cost of Interceptors = $1,442,000.00
**Division of Cost** - Romulus Township - 49.122% = $ 698,517.50
- Taylor Township - 50.878% 723,482.50
Capacity Allocation - Romulus Township - 41.4 c.f.s.
- Taylor Township - 16.3 c.f.s.

**PROJECT SECTION 6** - Estimated Cost of Interceptors = $ 778,000.00
**Division of Cost** - Taylor Township - 72.727% = $ 565,816.00
- City of Southgate - 27.273% = 212,184.00
**Capacity Allocation** - Taylor Township - 13.0 c.f.s.
- City of Southgate - 4.88 c.f.s.

### PART THREE - SUMMARY

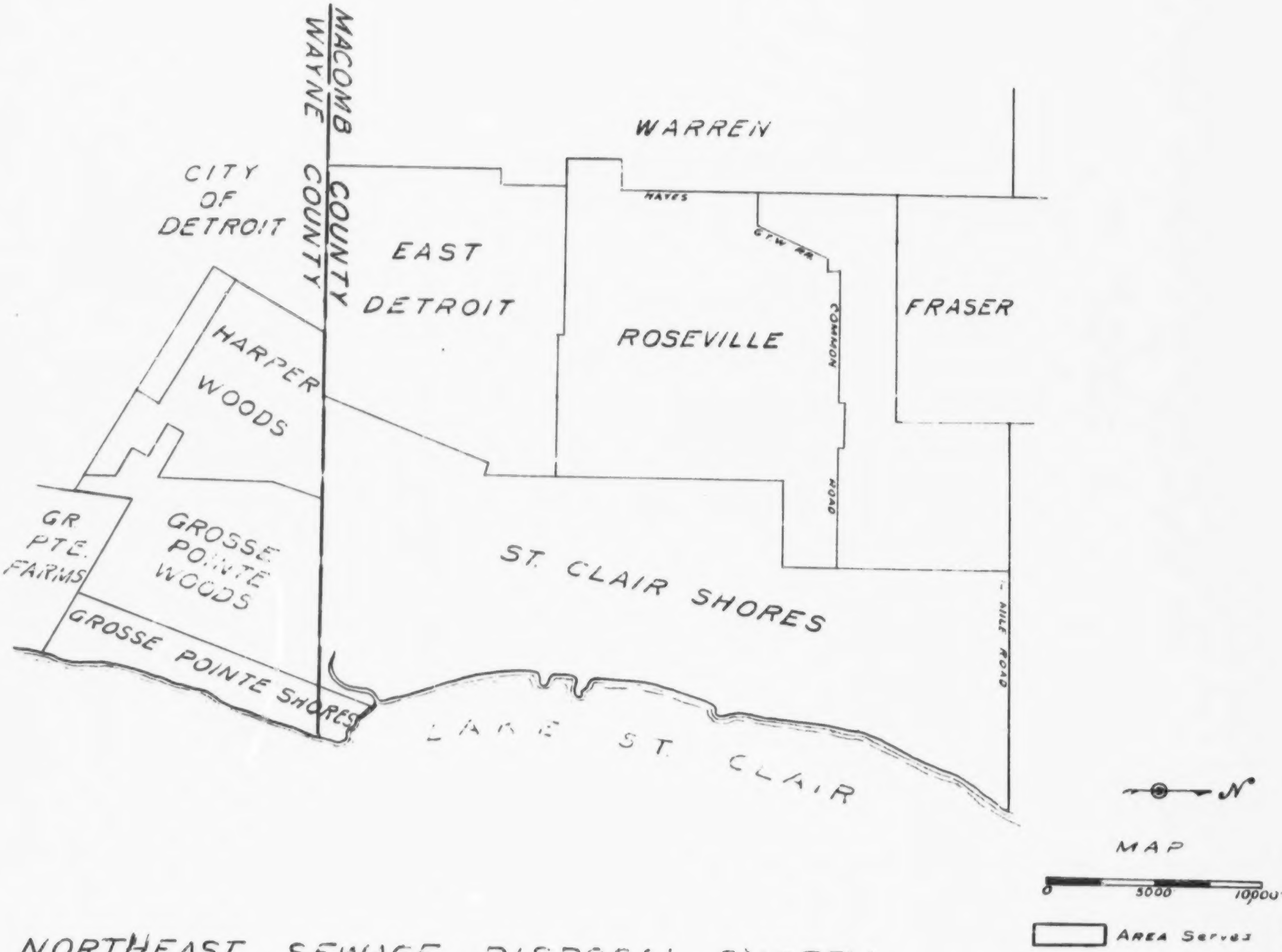
Estimated Cost of Interceptors = $2,000,000 - Division of Cost Romulus Township = 100%

EXHIBIT "B"

GPO 820815-8-24

Exhibit 4.11

44900


MACOMB COUNTY
WAYNE COUNTY
WARREN
CITY OF DETROIT
EAST DETROIT
ROSEVILLE
FRASER
HAYES
GTW RR
COMMON ROAD
MILE ROAD
HARPER WOODS
GROSSE POINTE WOODS
GR PTE. FARMS
GROSSE POINTE SHORES
ST. CLAIR SHORES
LAKE ST. CLAIR
N
MAP
0
5000
10000
Area Serves

NORTHEAST SEWAGE DISPOSAL SYSTEM

EXHIBIT A-2

449 pp

PROPOSED SYSTEM: The existing system is to be further improved by the installation of a peak flow booster station, at the Wayne-Macomb County line, to provide for a hydraulic gradient flow of 102 c.f.s. from Macomb County. Combined with the booster station installation, a submerged electric flow meter and control and backwater gate unit is to be constructed, to assure control of flows to those agreed upon. This will allow the Macomb County communities to correct any interceptor deficiencies.

At the existing Grosse Pointe Farms Pumping Station, the present pumps will be replaced to provide for pumping a peak sewage flow of 127 c.f.s. Three pumping units of equal capacity will be installed at each of the pumping stations; two of these pumps to handle the design flow, with the third unit in reserve.

The proposed system will serve an estimated population and design flow requirements to provide adequate sewage service for the Northeast Sewage Disposal System as follows:

| Municipality | 1960 U.S. Census | Built-Up Population | Built-Up c.f.s. |
|---|---|---|---|
| Roseville * | 50,195 | 80,000 | 37.8 |
| East Detroit | 45,756 | 46,000 | 22.5 |
| St. Clair Shores | 76,657 | 80,000 | 32.0 |
| Total-South Macomb Sanitary Dist. | 172,608 | 206,000 | 92.3 |
| Grosse Pointe Woods | 18,580 | 23,000 | 11.5 |
| Harper Woods | 19,995 | 21,000 | 8.4 |
| Grosse Pointe Shores | 2,192 | 5,000 | 2.5 |
| Total-Wayne County | 40,767 | 49,000 | 22.4 |
| Total-Northeast System | 213,375 | 255,000 | 114.7 |
| Unallocated Flow | | | 12.3 |
| Total Available Capacity into Detroit System | | | 127.0 |

* Roseville's recently annexed Erin Township area is included in the above estimates.

ESTIMATED CONSTRUCTION COST: The estimated cost of the proposed facilities is as follows:

| | | |
|---|---|---|
| Site or Right of Way | $ 11,000.00 | |
| Construction (labor, materials, etc.) | 306,000.00 | |
| Machinery & Equipment (installed) | 324,000.00 | $641,000.00 |
| Plans and Specifications | | 15,750.00 |
| Engineering and Supervision | | 25,200.00 |
| Contingencies (Construction) | | 41,751.00 |
| Financial and Legal Expense | | 3,337.00 |
| Flowage Rights | | 72,962.00 |
| | | $800,000.00 |

Construction bids were taken on April 4, 1961, and are within the engineers' estimate.

METHOD OF FINANCING TOTAL PROJECT:

| | |
|---|---|
| Wayne County Northeast Sewage Disposal System Revenue Bds. | $582,000.00 |
| Federal Grant under Public Law 660 | 218,000.00 |
| | $800,000.00 |

## SECTION 5

## FUTURE DEVELOPMENTS

A. Detroit to Construct Interceptors Outside City Limits

Recently the Corporation Counsel ruled that Detroit can legally construct interceptors outside the city limits. Negotiations are underway for Detroit to construct the Dequindre interceptor to serve the Southeastern Oakland County Sewage Disposal District. The Detroit Department of Water Supply can obtain the necessary financing at lower interest rates. Thus a precedent is set whereby the area-wide sewage treatment problem can be solved and pollution abated.

B. Water Main Construction Precedent:

Since 1956, the Detroit Department of Water Supply has financed and constructed water transmission mains to suburban areas in three counties. The service area has been and is continuing to be expanded to any community in the metropolitan area that desires water. To date, approximately 3,200,000 people in Detroit and 52 suburban communities, about 41 per cent of the population of Michigan, are receiving water from Detroit. Contract negotiations have been or are being concluded with several other suburbs. The area-wide water problem has been solved.

C. National Sanitation Foundation and Sanitation Council

## Michigan, Six County Sewerage and Drainage Study

### History:

The Supervisors Inter-County Committee represents the six Southeastern Michigan Counties of Macomb, Monroe, Oakland, St. Clair, Washtenaw and Wayne, which constitute the Detroit metropolitan area.

It covers 4,000 square miles and has a population of 4,200,000.

It was realized that this rapidly expanding area faced public health and growth problems such as water supply, sewerage, storm drainage and flood control. It was also realized that this was the responsibility of government and industry alike.

On January 19, 1956, the Supervisors Inter-County Committee requested the National Sanitation Foundation to conduct an Inter-County Water, Sewerage and Drainage Survey of the Detroit metropolitan area.

### Water Study:

On March 28, 1957, the report on the future water supply was submitted and accepted. It recommended that the city of Detroit become the central water authority for the area, and that facilities be developed to supply a population of over 6,000,000 people, preferable with an intake in Lake Huron. The Detroit Water Board accepted these recommendations and has started developing them. Thus the future water needs in the six county area are being taken care of today.

Sewerage and Drainage Study:

To facilitate the Sewerage and Drainage Study, a Sanitation Council for Southeastern Michigan was formed. It consists of about 50 members from government and industry and includes representatives of the Unites States Public Health Service, Michigan Department of Health and Michigan Water Resources Commission. A six-man Executive Committee was selected together with a Chairman and Secretary.

Budget:

It is estimated that this study will require two years. A budget of $305,000 has been approved to cover this period.

The budget has been derived from the following sources:

1) United States Public Health Service - $100,000 grant under the Public Law No. 660 - The Federal Water Pollution Control Act
2) Industries in the Detroit Metropolitan Area - $105,000
3) Government, Cities and Counties - $100,000

Air Survey:

The Detroit Edison Company has flown an aerial survey of the area at an estimated cost of $20,000 which is not part of the budget.

Engineering Board Selected:

The Technical Committee of the Sanitation Council with the approval of the Executive Committee selected the following Board of Consultants.

Dr. Abel Wolman, Chairman, of Baltimore

Mr. Albert Roth of Hubbel, Roth and Clark, Birmingham

Mr. Louis Ayres of Ayres, Lewis, Norris and May, Ann Arbor

Scope of Job:

It was realized that the only way to solve the area-wide sewerage and drainage problem was to develop a coordinated plan. It was also recognized that the longer nothing was done the more expensive it would become later. The area-wide water problem was solved first, and the metropolitan sewerage and drainage problem is to be solved next. The needs must be defined first then steps taken for their solution.

The study is to be pursued in four broad areas as follows

1) Determination of future needs
2) Determination of technical standards
3) Delineation of a Master Plan
4) Cost Estimates

1) Determination of Future Needs:

a) Preparation of a plan showing the existing and programmed sewerage and drainage system

b) A study of the demography of the area to determine the forecast population and urban development.

c) Determination of the future capacity requirements for both sewerage and drainage

2) Determination of Technical Standards:

The delineation of a master plan will require the following basic technical factors:

a) System to be used, separate or combined

b) Need for storm water treatment

c) Treatment process to be used, primary, intermediate or complete

d) Adoption of a unified or multiple system operation

3) Delineation of a Master Plan:

a) Ultimate objectives

    (1) Sewerage and drainage system

    (2) Sewage treatment process and facilities

b) Initial program

    (1) Sewerage and drainage system

    (2) Sewage treatment facilities

c) Intermediate programs

    (1) Sewerage and drainage system

    (2) Sewage treatment facilities

### 4) Cost Estimates

This study is unique in that it is the first time a cooperative financial agreement on the part of government and industry has been arrived at to help solve metropolitan area problems. A practical, well-planned, long-range solution will result which will enable the continued, orderly, economic growth of the Detroit metropolitan area.

(The Exhibits of Section 5 are as follows;)

Exhibit 5.1

## FINANCIAL SUPPORT

### Six-County Sewerage and Drainage Study

| | | |
|---|---|---|
| Required | — | $305,000 |
| Pledged to Date | | |
| From Business - Approximately | — | $ 60,000 |
| (Partial List Attached) | | |
| From Federal Government - United States Public Health Service | — | $100,000 |
| (Order Attached) | | |
| From Local Government - Water Department and County | — | $100,000 |
| Firm Appropriation | — | $260,000 |

Exhibit 5.2

| COMPANY | ALLOCATION | |
|---|---|---|
| The Detroit Edison Company | $ 20,000.00 | Had aerial photography done that is necessary for this type of work. |
| The General Motors Corporation | 15,000.00 | (Verbal). Promised check would be available to us this month. |
| The Ford Motor Car Company | | Indicated that if the General Motors Corp. pledged funds, so would they. |
| Michigan Bell Telephone Company | 10,000.00 | To be allocated later. |
| Michigan Consolidated Gas Company | 5,000.00 | |
| National Bank of Detroit | 3,000.00 | To be allocated later. |
| The Detroit Bank & Trust Company | 1,500.00 | Over 3-year period |
| The J. L. Hudson Company | 1,500.00 | Over 3-year period |
| Manufacturers National Bank | 1,200.00 | Over 3-year period |
| The Evening News Association (Detroit News) | 1,000.00 | |
| The Detroit Free Press | | Declined funds, but offered "column support". |
| The Bendix Corporation | 750.00 | |
| The Frito Company | 300.00 | |
| Jones & Laughlin Steel Corporation | 300.00 | |
| Algonac Division, Chris-Craft Corporation | 200.00 | |
| A. M. T. Corporation | 100.00 | |
| A. & P. Food Stores | 100.00 | |
| American Aggregates Corporation | 100.00 | |
| American-Standard Industrial Division | 100.00 | |
| Ann Arbor Bank | 100.00 | |

Reproduced from best available copy.

| COMPANY | ALLOCATION |
|---|---|
| Franklin Mortgage Corporation | $100.00 |
| J. A. MacIvor Lumber Company | 100.00 |
| Michigan Mortgage Corporation | 100.00 |
| Morton Salt Company | 100.00 |
| Peerless Cement Company | 100.00 |
| Scott Paper Company - Detroit Division | 100.00 |
| R. L. Spitzley Heating Company | 100.00 |
| Bliss & Laughlin | 50.00 |
| The Commercial & Savings Bank of St. Clair | 35.00 |

Many others have given us their verbal confirmations on supporting our program.

Exhibit 8.3

DEPARTMENT OF HEALTH, EDUCATION, AND WELFARE
Public Health Service
Bureau of State Services
Washington 25, D. C.

| AWARD | GRANT |
|---|---|
| DATE 2-26-62 | No. WPD-5-62 |

## NOTIFICATION OF AWARD WATER SUPPLY AND POLLUTION CONTROL DEMONSTRATION PROJECT GRANT

The grant described below has been approved.

**Title of Project:** Detroit Metropolitan Environmental Study

**Awarded to:** National Sanitation Foundation, Ann Arbor, Michigan

| Demonstration Project Director: | Payee (Check will be drawn to): |
|---|---|
| Henry F. Vaughan<br>President<br>National Sanitation Foundation<br>Michigan School of Public Health<br>Ann Arbor, Michigan | Walter F. Snyder, Executive-Director<br>Secretary-Treasurer<br>The National Sanitation Foundation<br>Michigan School of Public Health<br>Ann Arbor, Michigan |

**Grant Period:** 4-1-62/3-31-63

**Total Grant:** $20,000

**First Payment:** $5,000

**Balance Due:** $15,000

**Future Support (Tentatively approved subject to availability of funds and successful development of the project):**

**1st Additional Year:** $40,000

**2nd Additional Year:** $40,000

**Policy Statement:** The attached explanation outlines the policy relative to Demonstration Grants in water supply and pollution control and any additions applying to this award. (To be supplied)

**Acknowledgement:** The Project Director is required to: (1) acknowledge acceptance of the grant award, and (2) advise of any change in the starting date. Address letter to Chief, Research and Training Grants Branch, and refer to grant number above.

G. E. McCallum
Chief, Division of Water Supply & Pollution Control

Harry A. Faber
Chief, Research and Training Grants Branch

SECTION 6

## UNITED STATES PUBLIC HEALTH SERVICE
## VERSUS
## NATIONAL SANITATION FOUNDATION - SANITATION COUNCIL FOR SOUTHEASTERN MICHIGAN STUDY

The United States Public Health Service is to assist the State of Michigan in identifying and recommending methods for correcting pollution of the Detroit River and Lake Erie. The Michigan waters of Lake St. Clair, Detroit River and Lake Erie extending to the Michigan-Ohio State line and the river basins of the Clinton, Rouge, Huron and Raisin Rivers are within the scope of this study.

Two studies in the same area are not realistic and are a waste of funds. The United States Public Health Service would be financing two studies in the same area to accomplish the same aims.

The National Sanitation Foundation-Sanitation Council study is the one preferred to do the job for the following reasons:

A. The study is already underway. Nationally known consultants have been engaged, financing is nearly completed and governmental and industrial leaders are interested in and willing to get the present and long-range sewerage and drainage problem in the area solved.

B. This study is more inclusive. It will develop long-range plans and means for solving the sewerage and drainage problems. It will present a plan for the orderly and systematic development and costs of the facilities necessary. It will cover a larger area, extending north to Port Huron, south to the Ohio border and west to the far border of Washtenaw County. It will not be limited by state or international boundaries and hence will have metropolitan area, inter-state and international scope.

C. More constructiveness will be accomplished through willingness and cooperative effort than through threats and court action.

D. Two studies in the same area are not realistic.

E. Technical standards should not be changed now for the following reasons:

1. The area should first be brought up to Detroit standards.
2. Communities under contract are willing to pay for treatment under the present definition. Any changes in treatment should be gradual as some communities

cannot pay more and others are unwilling to pay and may rebel and cause lawsuits. This would tie up financing and all progress would cease.

3. Canadian Situation:

   a) There are no sewage treatment plants on the Canadian side of Lake St. Clair and the Detroit River. The only sewage treatment plant on the Canadian side of the St. Clair River is at Sarnia, which was placed in operation last year. Thus raw sewage and industrial wastes from a sizeable population including Windsor and its suburbs, Chatham, Wallaceburg and Ammherstburg, as well as many smaller communities, enter the river.
   In contrast, every city and town on the American side has a sewage treatment plant.

   b) There is no storm flow treatment on the Canadian shore.

   c) The expanding oil and petrochemical industry at Sarnia are releasing

continuous flows of industrial
wastes, along with occasional
slugs of high concentrations.

MR. REMUS: For the Court's benefit now I have several statements that I would like to add because they are not in our record, at least not as directly as I would like them there.

One is that all developments of our sewage system have been approved by the State health officials and meet the State requirements as far as performance is concerned.

The second statement refers to Mr. Kittrell's report when he mentioned 1.24 parts per million gallons in 1946 of phenol deposits that have been reduced to 1.04. To correct Mr. Kittrell, Trenton gets their water from the Detroit system. I think he will appreciate that.

The International Joint Commission balance of 2400 parts MPN cannot be maintained at our plant because the river count above our plant effluent is equal to that and, therefore, there is no room at all.

5. I would refer to the charts that were shown yesterday which showed Detroit's suspended solids with a very large circle, and Wyandotte's with a little less, and Dearborn also on the bacterial count. That was Detroit and 47 communities, including more than 300 square miles

and it does not adequately reflect the fact that Detroit's basic sewage system per capita performance is as good as any.

Further, I would like to refer to Mr. Kittrell's report where he stated yesterday, and we agree with him, that 99 percent of the bacteria in the area that gets in the Detroit River will be killed after the Rouge River has been taken care of. I would like to point out what it would cost to eliminate that last one percent. For Detroit, alone, if you are going to take the storm flow control to take that portion out, it would be in excess of $400 million.

Just visualize what is added to that by the additional areas, and there is just no financing base for that in existence.

Also I would like to point out it would be unwise to go beyond that one percent at this time because if we do we should also have the Canadian situation under control, and they do not yet have their sewage plants. To get 100 percent we would have to eliminate the sewage from or, to put sewage treatment in plants on 200,000 boats and put diapers on 29,000,000 ducks, and would have to eliminate sea gulls and get the cats and dogs off the streets, and as to the other fur bearing animals their wastes would have to be eliminated as well as that of the people.

I think it should be remembered in here that this is for the benefit of the human race in part.

I have only one further comment. It has been our experience that those areas that have complained the most in recent months are the ones that have the most reason to do something, but point their fingers the hardest in other directions.

Thank you.

(Applause)

THE CHAIRMAN: Thank you. Are there any comments or questions? I would like to point out just one thing on the record here. This is a really very effective and beautiful picture you have of the Rouge at its confluence with the Detroit River. I know that our black and white process is not going to do justice to it, though, and I hope you will not be disappointed when you see it in the transcript.

MR. REMUS: Yes. Since you mentioned the picture, however, I would like, if you or anyone here is interested enough to take a look at it, to say that we had a slide here but the projector disappeared today. It is colored film and shows the Rouge River and the Detroit sewage plant outfall and waste that comes down the American shore of the Detroit River. There are several factors that are in there. Obviously the biggest gob of waste, by a wide margin, in this is the Rouge River.

Secondly, that Detroit outfall, the sum total of that, mind you now, is between 2,600,000 and 3,000,000 people. It is not just one little stream or representing one little community. That is Detroit and 47 adjacent communities. There are 3,000,000 people in the area, but they do not yet get all their service. 3,100,000.

Also, on the upriver part, above the outfall, the situation is such that we have felt in our treatment practices that unless we wanted to pump the river in we were a little foolish to waste money doing it a great deal more than the way the river was.

The moral of this is simple: If we waste $1 for chlorine it means that many dollars we haven't got for building something; and the building is the most important thing in our estimation at this time.

THE CHAIRMAN: Dr. Heustis.

DR. HEUSTIS: I would like to call on Mr. Jim Davey of the Wayne County Road Commission at this time. Do you have a prepared statement?

STATEMENT OF JAMES M. DAVEY, MANAGING DIRECTOR
BOARD OF WAYNE COUNTY ROAD COMMISSIONERS

MR. DAVEY: I do.

The county of Wayne is vitally interested in the elimination or prevention of pollution in the Detroit River and Lake Erie. This interest is emphasized by the fact that we have under construction, scheduled for completion in 1963, a new water treatment plant and a system of major transmission mains, which will cost approximately 50 million dollars. Since the intake for raw water to serve this system is located in the vicinity of Fighting Island in the Detroit River, it is axiomatic that this source of raw water should be reasonably free of contaminance. In recognition of this fact, and in compliance with the mandate of the Michigan State Health Department, Wayne County has proceeded to correct existing deficiencies in the sewer system and treatment plants over which it has jurisdiction. This then is our purpose:

To preserve the public health and assure greater economic development by modernization of our sewage and sewerage system, and, at the same time, preserve a source of potable water in the Detroit River to serve the affected communities.

Wayne County today is in the midst of three major sewer expansion projects totalling more than 37 million dollars. These projects are part of an expertly conceived master plan designed to solve all the present and future needs of the county. It is true that the county's economic development has suffered in the past few years due to a lack of capacity in both transmission and treatment. This economic pale was caused by an overloading of sewerage systems in portions of the county resulting in a State Health Department construction ban. However, through community, governmental and citizen cooperation, this distressing problem has been solved.

Making use of its master plan for development, the county has implemented construction projects in the Northeast, Rouge Valley and Downriver Districts. The present projects in the Rouge Valley and Downriver Districts provide for the development of the area up to the maximum capacity of the present projects.

The master plan provides for the ultimate growth and development of Wayne County. I know that a discussion of sewers lacks general public appeal. However, the results obtained through well planned, well constructed and efficiently operated sewer system are dramatic. Community health and well being lead the list of these results. Following this is economic growth and development.

An adequate sewer system presents with it both industrial and economic development. This is already taking place in the Rouge Valley District where a building boom is being experienced. The same activity is expected for the Downriver District this spring.

Indeed, it is our position summarily stated, that all sources of alleged pollution over which the Board of Wayne County Road Commissioners and the Wayne County Department of Public Works exercises jurisdiction, have been corrected or are in the process of correction. This would include work at the Wyandotte, Trenton and Grosse Ile Plants.

Mr. George Bingham, who will also appear as a witness before this honorable committee, will supply a breakdown of our efforts in this regard and supplement my remarks.

DR. HEUSTIS: Thank you very much, and with the Chairman's permission we will hear from Mr. Bingham before we have questions of Wayne County.

These are the two representatives from Wayne County that we have.

STATEMENT OF GEORGE R. BINGHAM, SANITARY ENGINEER, WAYNE COUNTY ROAD COMMISSION DIRECTOR, DEPARTMENT OF PUBLIC WORKS, ON BEHALF OF THE COUNTY OF WAYNE, MICHIGAN

MR. BINGHAM: Since the mid-1930's Wayne County has recognized the then present and the then future problems confronting the county and its municipalities in regard to the correction or elimination of deficiencies in the sewerage systems serving the "out-county" area. Prior to that time, very little coordinated effort had been made to solve these problems on an area basis and local interests had approached the solution to local problems without much regard to the over-all problem of sewage collection and disposal and the accompanying public health implications.

By 1939, the county had completed and placed in service a $2,200,000 P.W.A. project which, while not completely satisfactory insofar as what was desirable, was a means to accomplish the greatest benefit to the area served and to the county with the money available. Small, inefficient treatment plants were abandoned, areas using septic tanks were connected to sewerage systems, discharge of sewage to streams was greatly reduced and the first steps toward a solution to these problems on a metropolitan area basis were taken.

During World War II, very little additional work was done, except for a project which provided five municipalities in the southeast part of Macomb County and three municipalities in northeast Wayne County with a connection through the county project to the sewage disposal facilities of the City of Detroit. This project, while small in size and cost was large in its effect upon the public health of the entire metropolitan area in that it minimized discharges of sewage into the recreational waters of Lake St. Clair which in turn are upstream from water supply intakes serving almost 2,000,000 people.

During the period just prior to the end of the war and immediately following, the county completed plans for the construction of facilities to supplement, augment and extend the facilities previously constructed. The work on these projects was unable to proceed at that time because the anticipated post-war slump in business activity and its accompanying unemployment did not materialize. The expected continuation of federal participation in public works projects did not occur and the county, because of its limited statutory ability to finance these projects was unable to proceed. The area continued to grow and the sewage disposal problems increased. In 1955, an extension to one of the facilities, allowing two small sewage treatment plants to be abandoned, was constructed by assessment under the Drain Law.

In 1956, the Board of Supervisors approved, in principle, a report and recommendation for a county master-plan project to correct remaining deficiencies in the existing system and to provide for the growth and development of the entire "out-county" area. The Board of County Road Commissioners, as the county's agent, prepared a detailed master plan together with a method of financing and presented it to the Board of Supervisors in 1958. This project, which proposed a $36 million program financed on a revenue basis, was approved by the Board of Supervisors and the accompanying revenue bond rate schedule was placed in effect. However, the Sewage Disposal and Water Supply Committee, sitting as a statutory board of review on rates, cancelled the increase and left the project without a method of financing. The subsequent search for alternate financing methods led the county to establish a County Department of Public Works to take advantage of certain financing provisions of the D.P.W. Statute. Utilizing personnel and available sewage disposal system funds provided by the Road Commission, the D.P.W. has, in a period of about 30 months, prepared plans and negotiated agreements to accomplish the financing of the much-needed improvement and expansion of most of the county system facilities. The Road Commission has also proceeded to arrange financing of other work where D.P.W. financing methods were not wholly suitable. A brief description of the county's accomplishments to date follows.

Northeast District Project cost $800,000,
Federal Grant $218,000.

This project consists of expansion of pumping facilities in leased space located in a sewage pumping stationowned by the City of Grosse Pointe Farms and the construction of a metering and peak-flow booster station at the county line. In concept, this project changes the existing interceptor from a strictly gravity sewer to a system which operates as a pressure conduit during times of maximum flow, at which time all areas served by this interceptor must pump their flow into it. The project assures the South Macomb Sanitary District of a fixed capacity and maximum hydraulic gradient at the county line. The project also provides treatment service to the Milk River District located in

Grosse Pointe Woods and Harper Woods in Wayne County. The Milk River Project consists of a storm water pumping station and a settling-skimming basin which can contain the flow from small storms and the first rush of flow from large storms. Following each storm, the basin is de-watered into the county system's sanitary interceptor and that flow is transported to the Detroit system for treatment and disposal.

Construction of this Northeast District project was made possible by adding a charge of $9.00 per million gallons to the regular charges for pumping and disposal, and by marketing Wayne County Revenue Bonds. The project is under construction, completion date this summer.

Rouge Valley District Project cost $18,000,000.

This area has been served from time to time by municipally operated treatment plants, by county system treatment plants and by sewage disposal service provided by the City of Dearborn and the City of Detroit. Almost half of the total project cost is for "outlet" interceptors which pass through the City of Dearborn, the City of Allen Park, the City of Melvindale and the City of Detroit, but do not serve these municipalities. The City of Detroit has agreed to receive the flow from this district into its system at two locations, with 94.5 cubic feet per second maximum at Ford Road and Southfield and 230 cubic feet per second maximum at Fort Street and the Rouge River.

The financing of this project has been achieved on the basis of a contract between the county and 14 municipalities in the district whereby each municipality has acquired a guaranteed capacity in the system and has agreed to make annual interest and principal payments over the next 40 years. All of the work is under contract except the Rouge River Siphon Structure which will be advertised for bids shortly. Provision has also been made for this project to serve an area within the Rouge Valley, but lying in Oakland County, in order that the branches of the Rouge within the area served by the county system may be kept free of pollution and suitable for the recreational uses of the flood-plain lands now enjoyed by the people of the metropolitan area. This project is sized, not for the ultimate capacity requirement of the service area, but was limited in size by the flow that the City of Detroit system was capable of receiving for treatment.

Down-River District Project cost $18,270,000. Federal Grant $373,500 (for part of project).

As in the areas previously described, the Down-River District Project augments, supplements and provides relief for the system facilities which have been in service for 23 years. Part of the area is served by a sanitary interceptor which discharges into a system of combined sewers and pumping station. During dry weather, the system performs satisfactorily, but during time of storm, only a small part of the sanitary sewage from this interceptor is pumped by the sanitary sewage pumps at the pumping station and receives treatment in the plant. When the hydraulic gradient at the pumping station is high, the connection of the sanitary interceptor to the combined sewer is closed and the flow from the interceptor is diverted to Ecorse Creek, or is pumped to Ecorse Creek, the Rouge River or the Detroit River. This not only is unsatisfactory from the standpoint of diversions, but creates operating problems at the treatment plant because of grit and low sludge content of the flow during times of storm and the excess sludge in the flow as combined sewer systems are de-watered following the storms. The enlarged treatment plant will have its own pumping station and a separate extension of the sanitary interceptor from the present point of connection to the new pumping station will eliminate these overflows and discharges of sanitary sewage. Additional parts of the project will remove sanitary sewers from their present connections to combined sewers, will provide for relief of overloaded facilities and will remove the dependence upon septic tanks from most areas now served by them and will allow the growth of the area to benefit from the water filtration and pumping station with its transmission mains all of which are now under construction. The project will allow two treatment plants operated by the county system and one small plant operated by the City of Belleville to be abandoned and taken out of service.

The county has made an offer to certain Washtenaw County communities, offering them the opportunity to join with Wayne County in the construction of this project and to be served by this system on a permanent basis. While no reply to this offer has been received, it has been reported that the City of Ypsilanti is proceeding to expand a treatment plant discharging effluent to the Huron River.

The cities of Trenton and Riverview were included in previous drafts of the financing and disposal agreement, but refused to sign the contract, preferring instead to build their own small treatment plants, rather than to join the county system project.

Since these projects could not be completed for at least 18 months, the county is preparing the necessary facilities to serve these two municipalities until they remove their flow from the county system. In the case of Riverview and the north part of Trenton, these facilities will consist of a connection from the present interceptor to the new pumping station. In the case of the area served by the county system's plant located in Trenton and serving the rest of Trenton and all of the City of Gibraltar, the county system will temporarily expand the facilities at the plant.

Flat Rock and Rockwood

At Flat Rock, the plant will be expanded to approximately twice its present capacity, assisted by a $45,000 federal grant against a total cost of $153,000. The balance of the cost will be raised by selling $110,000 in revenue bonds based upon an increase of six and a half cents per thousand gallons of water used plus a $25 connection charge for each new user.

At Rockwood, the same type of increase in service charge has been proposed to the Village in order that a similar project might be undertaken for the county system's plant at Rockwood. The only difference between the two would be that for the Rockwood project,no bonds would be sold and the project would be constructed in stages, mostly on a force-account basis, using funds advanced by the county system and recovered from the increase in service charges.

On Grosse Ile, the county operates two small sewage disposal plants owned by and leased from the Township of Grosse Ile, one of which is a temporary facility, the other being a permanent installation. The necessary proceedings have taken place and easements and right-of-way are now being acquired for the construction of a sewage disposal plant and system of lateral sewers and interceptors under the Drain law.

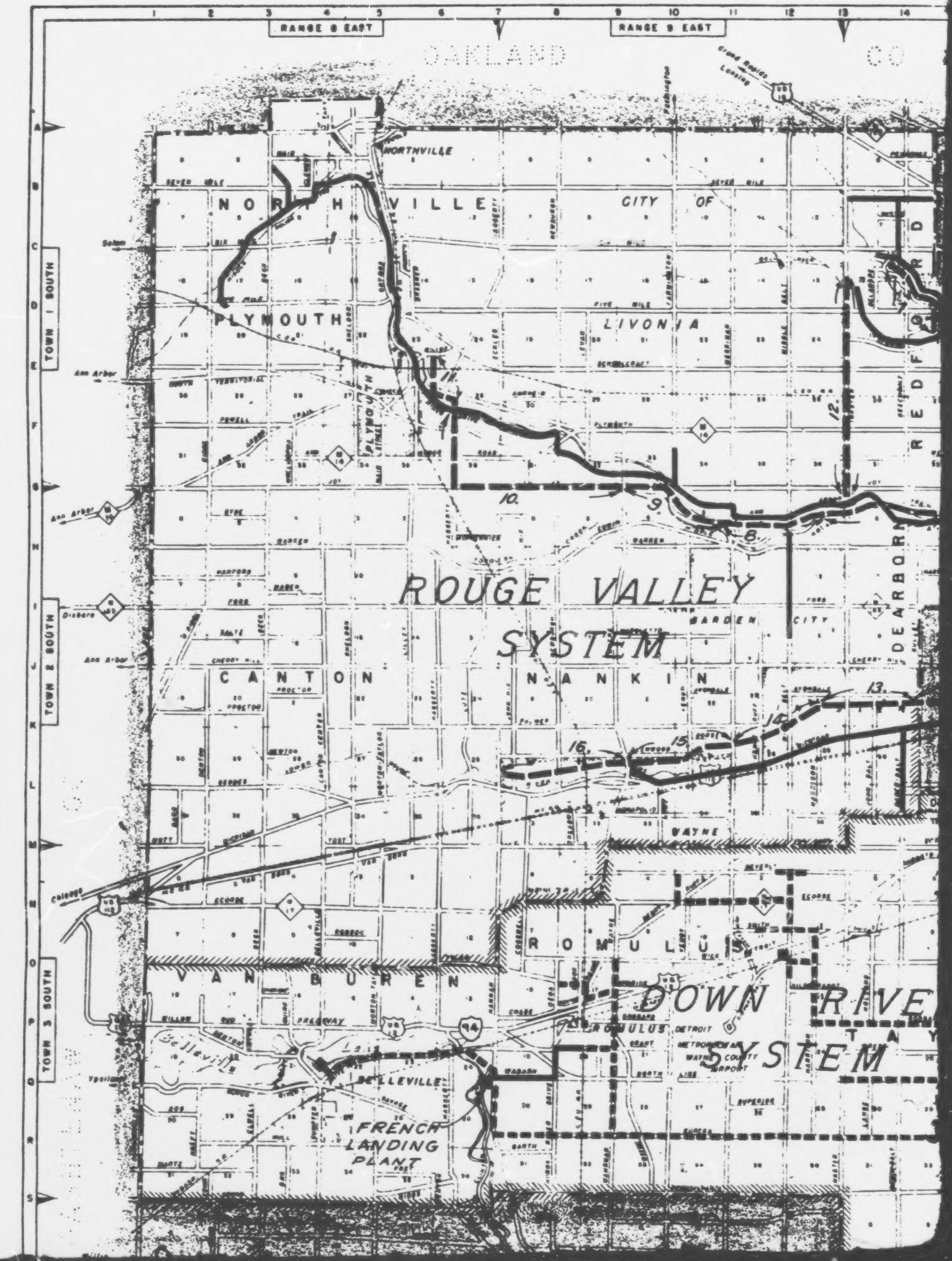
The present projects in the Rouge Valley and Down-River Districts provide for the development of the area up to the maximum capacity of the present projects. The ultimate growth and development of the rest of future metropolitan areas in the Rouge and Huron Valleys will be made possible by future projects which although part of the county's master plan, are not yet even in the preliminary concept state -- only the general location and faction of these projects have been set.

The county has also established a policy of approving no new additional combined sewer systems and has limited approval of combined sewer extensions to those areas now served by such systems.

Wayne County has recognized the problem, has prepared a master plan, has prepared and negotiatied the necessary financing agreements, and has now reached a point where it can be said that the only thing that remains to be done is to complete the construction of approximately $27 million worth of improvements. The next stage in the development of the master plan will come in approximately twenty years. In the interim, the metropolitan area can enjoy residential, commercial and industrial growth as a result of these projects, and diversion to the water-courses of untreated or inadequately treated sewage will have been greatly reduced, if not entirely eliminated.

Thank you very much.

(The Wayne County map attached to the statement of Mr. Bingham is as follows:)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ROMULUS
VAN BUREN
DOWN RIVER SYSTEM
TAY
BELLEVILLE
Belleville
FRENCH LANDING PLANT
ROMULUS DETROIT METROPOLITAN WAYNE COUNTY AIRPORT
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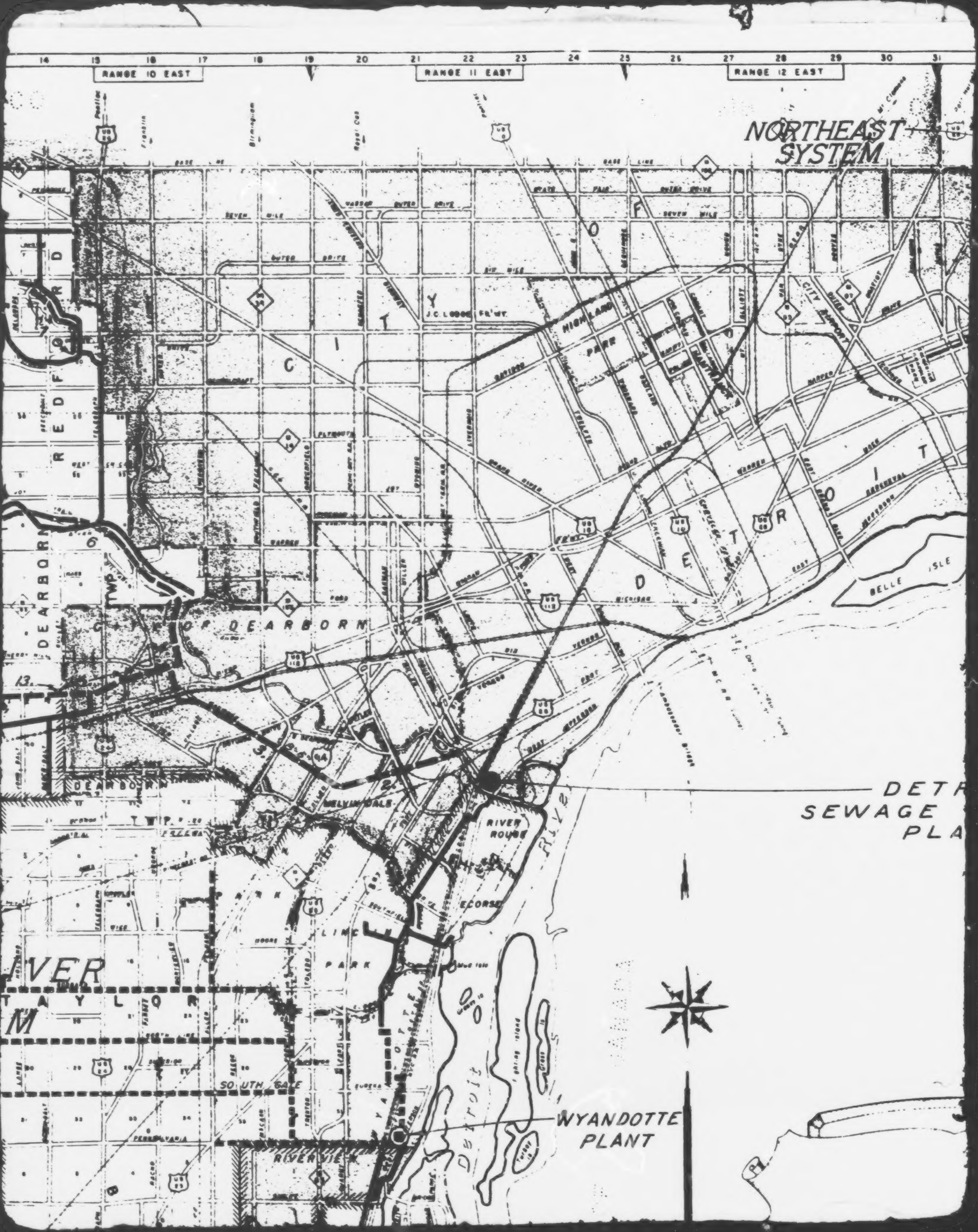
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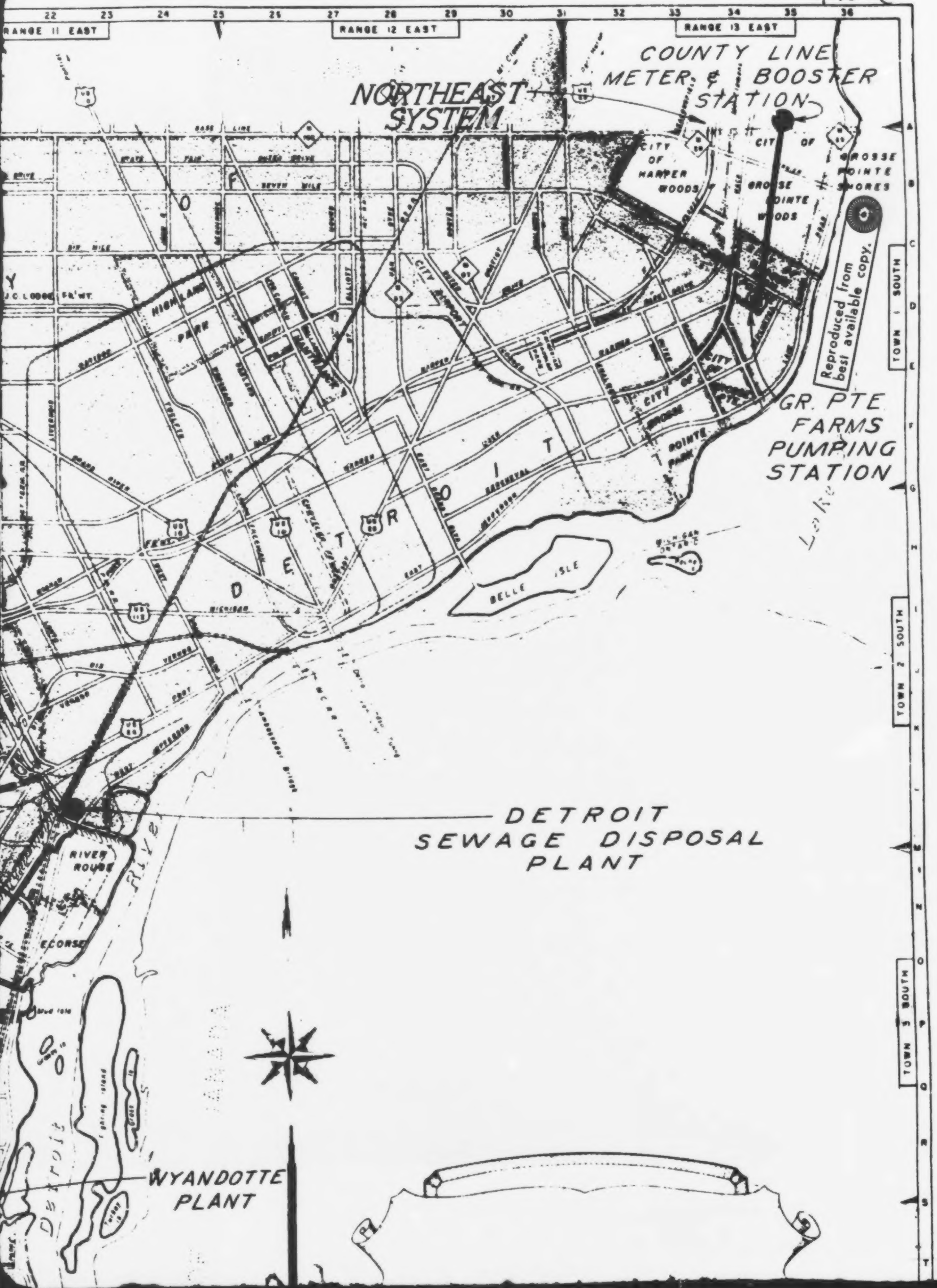
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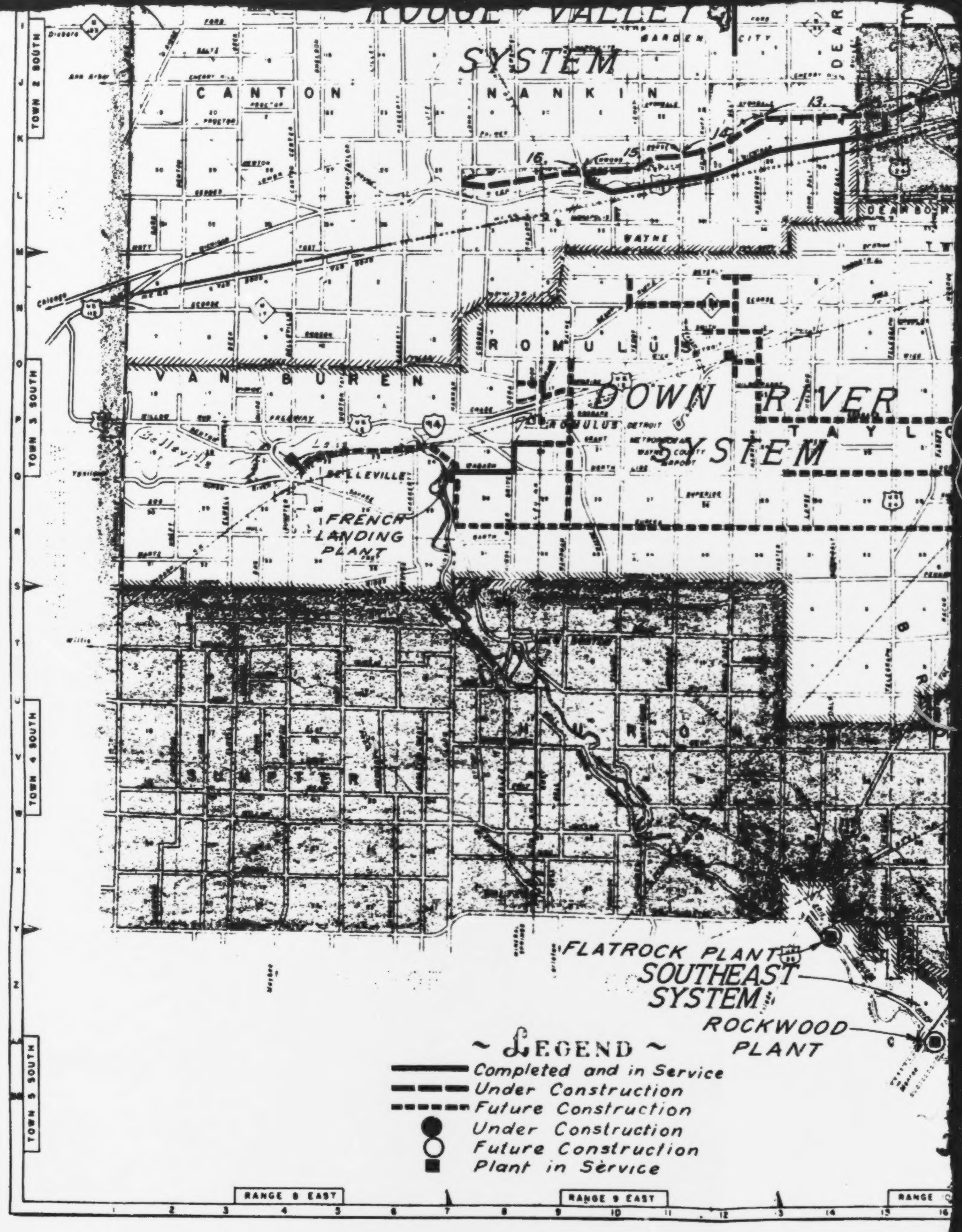
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Future Construction
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Plant in Service
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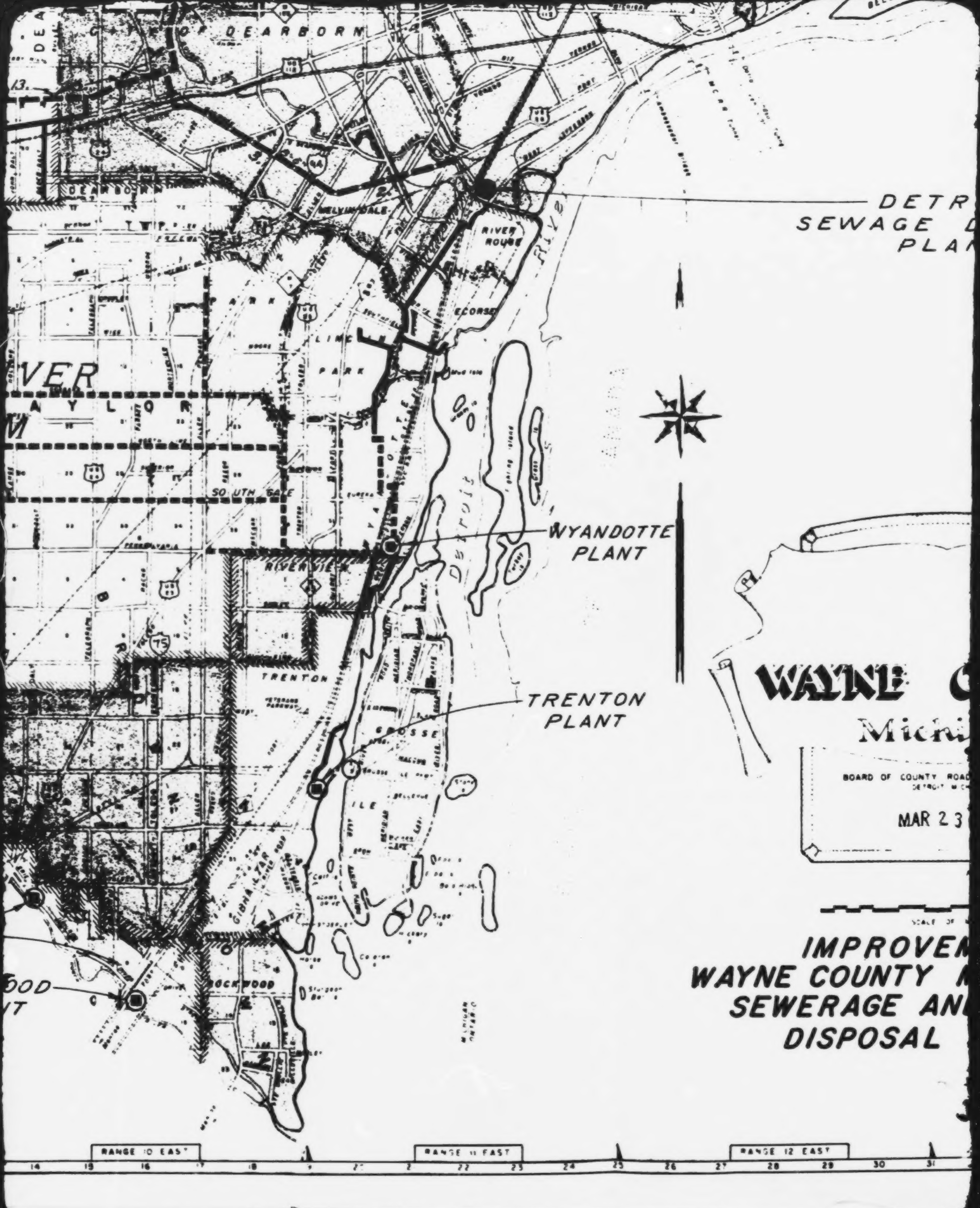
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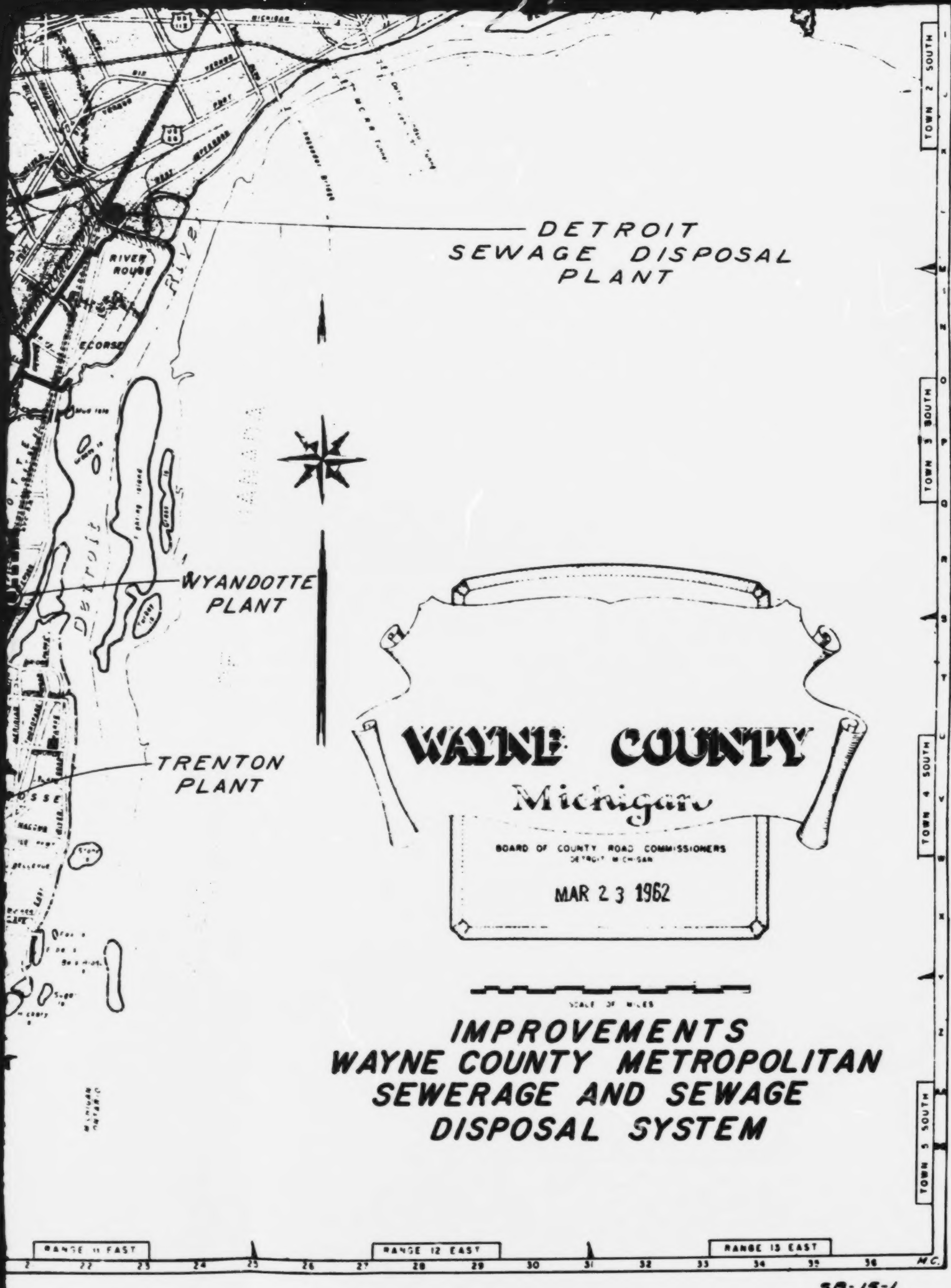
DETROIT SEWAGE DISPOSAL PLANT
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# IMPROVEMENTS
# WAYNE COUNTY METROPOLITAN SEWERAGE AND SEWAGE DISPOSAL SYSTEM

SB-15-1

THE CHAIRMAN: Thank you. Dr. Heustis.

DR. HEUSTIS: The next person that I would like to call would be from the Supervisors Inter-County Committee, and as I understand it Mr. David Calhoun has a very brief statement to present on their behalf.

STATEMENT OF DAVID R. CALHOUN, CHAIRMAN,
PHYSICAL PLANNING COMMITTEE, SUPERVISORS
INTER-COUNTY COMMITTEE, MACOMB-MONROE-
OAKLAND-ST. CLAIR-WASHTENAW-WAYNE, MICHIGAN

MR. CALHOUN: This is a very general statement which I think would be of interest to all and that is why I would like to read it.

Secondly, as the only elected official on the program, being the Mayor of my own town, I didn't want to leave without saying a few words.

The Supervisors Inter-County Committee as one of the founders and supporters of the Sanitation Council of Southeastern Michigan, would like to present testimony concerning the action of the Sanitation Council over the past two years concerning pollution in the lower Detroit River and Western Lake Erie.

The Sanitation Council of Southeastern Michigan was established by action of the Six-County Supervisors Inter-County Committee (Oakland-Macomb-Wayne-St. Clair-Washtenaw-Monroe) for the purpose of studying the sewerage problems (sanitary and storm) in the six-county area and the preparation of a Master Plan for an ultimate solution.

The Sanitation Council of Southeastern Michigan is under the direction of six sponsors: 1) Supervisors Inter-County Committee, 2) Southeastern Michigan Metropolitan Community Research Corporation, 3) National Sanitation Foundation, 4) Greater Detroit Board of Commerce, 5) Detroit Metropolitan Area Regional Planning Commission, and 6) City of Detroit.

Preliminary discussions established the following "Statement of Scope" for the proposed program.

In order to guide the development of proper sewerage and drainage programs in the Six-County Area, the following study will be required.

The study should be pursued in four broad areas as follows:

1) Determination of future needs
2) Determination of technical standards
3) Delineation of a Master Plan
4) Cost estimates.

DETERMINATION OF FUTURE NEEDS

The determination of future needs will require in general the following information:

1) Preparation of a plan showing the existing and programmed sewerage and drainage system.

2) A study of the demography of the area to determine the forecast population and urban development.

3) Determination of the future capacity requirements for both sewerage and drainage.

## DETERMINATION OF TECHNICAL STANDARDS

The delineation of a Master Plan for the Six-County area will require initially that the following basic technical factors be established:

1) System to be used, Separate or Combined.
2) Need for storm water treatment.
3) Treatment process to be used, primary, intermediate, complete.
4) Adoption of a unified or multiple system operation.

## DELINEATION OF A MASTER PLAN

The delineation of a Master Plan should be comprehensive to include the following information:

1) Ultimate Objectives as to:
    a) Sewerage and drainage system
    b) Sewage treatment process and facilities.
2) Initial Program
    a) Sewerage and drainage system
    b) Sewage treatment facilities

3) Intermediate Programs

  a) Sewerage and drainage system

  b) Sewage treatment facilities

## COST ESTIMATES

Cost estimates will of necessity have to be made on the basis of preliminary and schematic designs and also as of a certain date. Subsequent statements of cost will have to take into consideration any fluctuation of the construction cost index.

On the basis of the "Statement of Scope," the following action has already been taken by the Sanitation Council of Southeastern Michigan.

1. Mr. John R. Wilt, Manufacturers National Bank, was appointed Chairman of the Executive Committee;
2. Mr. Clyde L. Palmer, City Engineer, City of Detroit, was appointed Chairman of the Technical Committee;
3. The Technical Committee and the Executive Committee have selected three consultants who will work with the Technical Committee, namely, Hubbell, Roth, & Clark; Lewis, Ayres, Norris and May; and Abel Wolman;

4. A budget of $305,000 has been approved by the Executive Committee;

5. The Finance Committee has already obtained commitments in the following amounts:

| | |
|---|---|
| United States Public Health Service.... | $100,000 |
| Local Government........................ | 100,000 |
| Industry................................ | 60,000 |

6. An aerial survey of the six-county area has been made at a cost of approximately $20,000 as part of the contribution of The Detroit Edison Company.

The Sanitation Council of Southeastern Michigan expects that very shortly the program will be fully implemented and will be completed in two years.

As shown in the foregoing statements of fact, the Sanitation Council of Southeastern Michigan is a well-planned cooperative effort between Government and Industry which will produce, for the foreseeable future, a Master Plan to guide the six-county area in the orderly and proper programming of its sewerage and drainage construction to adequately meet the developing needs of the area.

The urgent need for a Master Plan cannot be over-emphasized. Considerable work has been done in the past both as to planning and construction. At least $100,000,000 worth of sewer construction is now under contract in the area and about the same amount is being prepared for advertising at an early date. All this work will have significant bearing on the problem of pollution control in the entire area. In addition, upon completion of a Master Plan, the consolidation of the various systems, both existing and future, into a unified system, will require additional construction costing in the neighborhood of $500,000,000.

In the opinion of the Chairman of the Technical Committee of the Sanitation Council of Southeastern Michigan, the superimposing of action by the Department of Health, Education & Welfare in the area at this time may disturb past and future efforts of the Sanitation Council of Southeastern Michigan.

THE CHAIRMAN: Thank you. Dr. Heustis.

DR. HEUSTIS: I would like to call Mr. Ken Hallenbeck, of the Huron-Clinton Metropolitan Authority, who also has an extremely brief statement to make.

STATEMENT OF KENNETH L. HALLENBECK, DIRECTOR,
THE HURON-CLINTON METROPOLITAN AUTHORITY,
1750 GUARDIAN BUILDING, DETROIT 26, MICHIGAN

The following brief statement is submitted to indicate our interest and concern in the above subject.

This Authority was made possible by an enabling act of the 1939 Michigan Legislature which permitted a referendum in the general election of November, 1940 in the counties of Livingston, Macomb, Oakland, Washtenaw and Wayne.

The voters of these five counties approved the formation of the Huron-Clinton Metropolitan Authority and directed that it proceed to acquire, develop and operate park and recreational facilities for its people.

The Authority has since acquired, developed and operated three major facilities: Kensington Metropolitan Park, consisting of 4,500 acres on the Huron River in Livingston and Oakland Counties; Metropolitan Beach with 550 acres on Lake St. Clair in Macomb County; and Lower Huron Metropolitan Park, a 2,000 acre area on the Huron River in Southern Wayne County. A more recent major facility is being developed on Stony Creek, a tributary of the Clinton River, consisting of more than 3,000 acres, in Macomb and Oakland Counties. Among the important features of these parks has been swimming.

These ventures along with smaller units on the Huron and Clinton Rivers were used as a basis for a recent Park Users Survey conducted by the Detroit Metropolitan Area Regional Planning Commission.

This study indicated that the major activities that attracted people to the regional parks in order of their preference were picnicking, rest-relaxation, and swimming. The survey in the Authority parks consisting of Kensington Park and Metropolitan Beach showed that swimming was the dominant attraction.

Due to these findings and the emphasis placed on swimming and other water uses as a major attraction to Regional parks, the Authority finds itself concerned with the condition of waters in and bordering all of the above five counties and offer our continuing cooperation with your office and all other agencies -- national, state and local -- toward a total abatement of water pollution.

MR. MALLONEN: Mr. Chairman, the statement is already made part of the record.

DR. HEUSTIS: That's right.

MR. MALLONEN: I would just like to make a short addendum to it.

DR. HEUSTIS: All right. For the record, or not for the record?

MR. MALLONEN: For the record.

DR. HEUSTIS: Go ahead.

STATEMENT OF EDWARD A. MALLONEN, REPRESENTING
MR. KENNETH HALLENBECK, DIRECTOR, THE HURON-CLINTON METROPOLITAN AUTHORITY

MR. MALLONEN: This is merely a statement made in the light of experiences had by the Michigan Conservation Department at Sterling Monroe bathing beach. It is the consensus of the Authority that any displacement of any swimming facility in the Greater Detroit Metropolitan Area can cause burdensome loads on the facilities supported by the Authority, such as at Metropolitan Beach, for example, which is in Macomb County, on Lake St. Clair. It can be described as a bathing facility on Lake St. Clair near the mouth of the Clinton River, and may be described as an expenditure of about $8,000,000, catering to people in the metropolitan area with an amount of about one and a half million annually.

While this session is limited to Lake Erie and the Detroit River, we do feel any facility displaced in the downriver areas can cause great concern on the part of the Authority in the facilities it now supports.

THE CHAIRMAN: Thank you. Are there any questions?

DR. HEUSTIS: I would like next to call on the Oakland County Department of Public Works. I do not have the name of an individual.

MR. REID: I thought the Regional Planning Commission was next.

DR. HEUSTIS: I beg your pardon. Did I get mixed up here?

MR. REID: We were to come after the Supervisors Inter-County Committee. To take an extra second of your time, Mr. Chairman, and conferees, may I say we are somewhat in the position now of the engaged couple in the nudist camp who decided to break their engagement -- they had been seeing too much of each other.

THE CHAIRMAN: Would you identify yourself, please?

MR. REID: I am Paul Reid, Director of the Detroit Metropolitan Area.

THE CHAIRMAN: Without clothes it's hard to distinguish.

STATEMENT OF PAUL M. REID, EXECUTIVE DIRECTOR,
DETROIT METROPOLITAN AREA REGIONAL PLANNING
COMMISSION, 800 CADILLAC SQUARE BUILDING,
DETROIT 26, MICHIGAN

MR. REID: The Detroit Metropolitan Area Regional Planning Commission is the official regional planning agency for the five-county area of Wayne, Oakland, Macomb, Washtenaw and Monroe counties. It was established under state enabling legislation in 1947 and is concerned with the preparation of sound plans to guide the physical development of this area.

At its meeting on March 22, 1962, the Executive Committee of the Commission considered the purpose of the conference called for March 27-28, 1962, and adopted the closed resolution.

The Executive Committee further directed that the Executive Director of the Commission, Paul M. Reid, and the

Deputy Director for Facility Planning, Fred Cheek, attend the conference and participate in its proceedings.

The resolution referred to is as follows:

WHEREAS the Detroit Metropolitan Area Regional Planning Commission has been concerned about the problem of pollution in the Detroit region and in 1949 first undertook staff studies and established advisory committees on drainage and pollution in the river basins of the region,

WHEREAS subsequent studies of water supply needs and priorities and of sanitary sewer and storm drainage needs and priorities have been conducted and the findings publicized,

AND WHEREAS the Detroit Metropolitan Area Regional Planning Commission has been a constituent member of the Sanitation Council of Southeastern Michigan, joining in a cooperative effort of the six agencies to undertake studies and plans for proper region-wide systems of sanitary sewer and storm drainage facilities to insure public health and provide safe water supply for the people and economic enterprises of the Detroit region,

THEREFORE, BE IT RESOLVED that the Detroit Metropolitan Area Regional Planning Commission:

(1) Recognizes the general concern of the federal government in pollution problems and appreciates its willingness to provide assistance in

solving these problems in the Detroit region, as demonstrated by a pledge of funds to the Sanitation Council of Southeastern Michigan, and

(2) Reaffirms its faith in the cooperative effort of the Sanitation Council of Southeastern Michigan, directed and conducted by local governmental and private agencies, and pledges its continued desire to assist in carrying through an adequate study and proper plan for regional sanitary sewer and storm drainage facilities in the Detroit region.

The above resolution was adopted at the March 22, 1962, meeting of the Executive Committee of the Detroit Metropolitan Area Regional Planning Commission.

/s/ Gerard H. Coleman, Secretary

Thank you.

THE CHAIRMAN: Thank you.

DR. HEUSTIS: The Oakland County Department of Public Works. I have a statement here from them.

MR. RINGLER: My name is D. W. Ringler, Deputy Director of the Oakland County Department of Public Works. Since this statement is a combined statement of our Department and the Office of the Drain Commissioner, and is on file I will not attempt to read it.

DR. HEUSTIS: For the record I have a letter dated March 22, signed by R. J. Alexander with a statement attached which will be entered into and made a part of the record.

STATEMENT OF THE DEPARTMENT OF PUBLIC WORKS,
COUNTY OF OAKLAND, MICHIGAN AND THE DRAIN
COMMISSION, COUNTY OF OAKLAND, MICHIGAN.

STATEMENT PRESENTED TO DETROIT RIVER-LAKE ERIE
CONFERENCE ON MARCH 27, 1962

Various areas of Oakland County are naturally tributary to five different river basins, three of which are within the scope of this conference, namely, the Rouge, Clinton and Huron Rivers and the jurisdiction over pollution control facilities is divided between the Drain Commissioner and the Department of Public Works. This letter is, therefore, being submitted on behalf of both Oakland County Departments.

ROUGE RIVER BASIN:

Approximately 150 square miles of Oakland County lies within the Rouge River Basin and during the past several years considerable planning and construction has been done to provide sanitary facilities for this rapidly developing area. The municipalities of Bloomfield Hills, Bloomfield Township, Birmingham and Lathrup Village were cited by the Water Resources Commission for pollution of the Rouge River and pursuant to this action the Evergreen Interceptor was constructed in 1959 and 1960 to provide interceptor sewers for a 70 square mile area and serves the above municipalities and all or part of an additional four municipalities. During this same period the Farmington Interceptor was constructed to serve an additional 50 square mile area. Both of these systems were designed to serve the area under ultimate built-up conditions (340,000 population) at rates of 259 gallons per capita per day, for strictly sanitary districts and 942 gallons per capita per day, for areas served by combined sewers. Treatment of sewage is provided by the City of Detroit through a contract between Detroit and Oakland County. These two interceptors, along with six extensions constructed during the past year, were constructed at a total cost of $14,548,000.00.

It is our opinion that adequate facilities have been constructed and are available to control pollution within the Rouge River Basin of Oakland County.

CLINTON RIVER BASIN (Area of Oakland County
directly tributary to
Clinton River proper)

The pollution control projects within this area that are either under construction or in the planning stage are listed as follows:

(a) City of Pontiac - The City of Pontiac was cited by the Water Resources Commission for pollution of the Clinton River and in 1961, $3,500,000.00 of Court Order bonds were sold to construct a new sewage treatment plant. Both primary and secondary treatment is provided.

(b) Village of Rochester - The Village of Rochester was also cited by the Water Resources Commission and in 1961, $350,000.00 of Revenue Bonds were sold to expand the primary treatment facilities and to add secondary treatment facilities.

(c) M.S.U.-Oakland - A sanitary sewer system and interim sewage treatment plant was constructed in 1960 to provide sewage disposal service for the new Michigan State University-Oakland and surrounding areas. This system provides both primary and secondary treatment and was constructed at a cost of $800,000.00.

(d) The remainder of this district is virtually without sanitary sewers and consequently septic tanks are used for sewage disposal, however, plans for an interceptor system have been prepared under a $311,000.00 planning advance from the Housing and Home Finance Agency. Treatment would be provided by either the construction of a treatment plant on the Clinton River or by the construction of an interceptor to the Detroit system, if and when a contract can be negotiated with the City of Detroit.

It is our opinion that adequate measures to abate pollution, with minor exceptions, have either been constructed or are being constructed. The only exceptions to this statement are those areas where septic tank facilities do not function properly during certain seasons of the year, however, trunk interceptors and lateral sewers will be constructed when the service district is sufficiently developed to support a bond issue.

CLINTON RIVER BASIN: (Area of Oakland County tributary to Clinton River via Red Run Drain)

In 1942, the Oakland County Drain Commissioner constructed the Southeastern Interceptor, which provided sewage disposal service for approximately 48 square miles in the south-east corner of Oakland County. The facilities consisted of a sanitary interceptor from the outlets of the Royal Oak, Campbell Road, Lawson and John R. Road Drains to the City of Detroit sewer system south of 8 Mile Road and serves all or part of the Cities of Hazel Park, Madison Heights, Ferndale, Huntington Woods, Pleasant Ridge, Royal

Oak, Clawson, Oak Park, Berkley, Birmingham, Troy, Southfield, the Village of Beverly Hills and Royal Oak Township.

Since 1942, the population within Southeastern Oakland County Sewage Disposal System District has increased substantially and, therefore, the Oakland County Drain Commissioner has a $40,000,000.00 storm relief system under contract for construction, and intends to have a relief sanitary interceptor and the enclosure of a portion of the Red Run Drain under contract within the next several months to control pollution. The relief interceptor, which will be known as the Dequindre Interceptor, along with the Red Run Enclosure, will provide for a total flow of 198 c.f.s. from an estimated future population of 500,000 people to outlet into the Detroit system.

The storm relief system (12 Towns Drain) outlet is provided with a high weir outlet structure designed to provide storage in the system amounting to 100 acre feet and at the same time skim the overflow. The Dequindre Interceptor will de-water the system after each storm. It is anticipated that no overflow will occur with rains of less than .10 inch over the area. Since the service area is not fully developed, it is estimated that the total average volume of storm water to be treated in any one year, based on an initial maximum interceptor rate of 115 c.f.s., will be approximately 12,000 acre feet. For any given year this volume can be expected to vary from 5,000 acre feet to 18,000 acre feet with spills occurring only about twelve times per year. The estimated cost of the Dequindre Interceptor and Red Run Enclosure is $7,480,000.00.

It is our opinion that the construction of the 12 Towns Relief Drain, the Dequindre Interceptor and the Red Run Enclosure will adequately abate pollution.

## HURON RIVER BASIN:

This section of Oakland County is rather sparsely populated, and except for several small Villages that have constructed sewage treatment facilities, septic tanks are in general use. A detailed preliminary plan for trunk sewers and treatment facilities or interceptor to a metropolitan system is being prepared under a planning advance from the Housing and Home Finance Agency. Since these studies are not complete, we are not in a position to comment on the adequacy of measures to abate pollution in this basin

## SUMMARY:

During the past four years, Oakland County municipalities have expended $19,198,000.00 for sanitary interceptors and treatment facilities to abate pollution and an additional $40,000,000.00 for relief sewers to protect the public health. It is also estimated that at least $7,480,000 will be expended in 1962 for interceptor facilities. We firmly believe that the major sources of pollution either have or will be corrected by the end of 1962 and that facilities for the unsewered areas of the County will be provided when bonding permits.

Very truly yours,

/s/ R. J. Alexander, Director
Oakland County Department of Public Works

/s/ Daniel W. Barry, Drain Commissioner

DR. HEUSTIS: The next city I would like to call is the City of Wyandotte. I saw George Hazey here.

STATEMENT OF CARL F. BUFE, SUPERINTENDENT, DEPARTMENT OF MUNICIPAL SERVICE AND GEORGE J. HAZEY, SUPERINTENDENT, WATER DIVISION, DEPARTMENT OF MUNICIPAL SERVICE, 2555 VAN ALSTYNE BLVD., WYANDOTTE, MICHIGAN

MR. BUFE: I am Carl Bufe, Superintendent of Municipal Service of the City of Wyandotte, which department operates the water and electrical department. Mr. Hazey, Superintendent of the Water Division will make the statement.

DR. HEUSTIS: Can you prevail on Mr. Hazey to cut his statement down, Mr. Bufe?

MR. BUFE: I have been working on him.

DR. HEUSTIS: Mr. Hazey, anything you can do to shorten the presentation of this extremely important material will be greatly appreciated.

MR. HAZEY: I will speak as fast as I can, Doctor.

The City of Wyandotte, on the west bank of the Detroit River, has been the home of its citizens and its industries for over 100 years. Its present population is about 44,000. Two of its major industries, whose reputation and products are nation-wide in scope are: The Wyandotte Chemicals Corporation and its J. B. Ford Division, and the Pennsalt Chemicals Corporation and its west plant division, the former Sharples Company.

Water and electric power utilities are city owned, and the Detroit River is the source of water supply for both units. Since 1948 approximately $10,000,000 has been spent for expansion of these utilities, paid for by earnings, and without any increase in consumer rates. Both utilities are free of bonded indebtedness. Fire protection services and public lighting services are installed, maintained and operated by the utilities division at an annual cost of $1.00 each to the city government. Corrosion control of water mains, now in its 10th year, and fluoridation, now entering its 12th year, are provided without additional cost to the consumer. Presently under construction for the water division are modern mixing and settling facilities, costing $800,000 will be paid for by cash on hand. In the engineering stage presently is a program for an addition to our water distribution system approximating a cost of $1,250,000. The water service for our consumers has no restrictions as to use for air-conditioning and lawn sprinkling. Our basic water rates have not been increased since their adoption in 1927.

The activities of our utilities divisions are directed towards improving service, attracting new industries and people, continuing adequate service at low cost to the consumer, and making our community a better place in which to live.

Copies of the 68th Annual Report, for the fiscal year ending September 30, 1961 are presented for the record.

On July 21, 1950 at about 1:30 PM the City of Wyandotte placed in operation a new raw water intake line. This line was constructed at a cost of approximately $211,000. The line extends into the Detroit River about 1800 feet from the American Shore. The intake crib for this line was located at a point to provide a water of acceptable quality as the source of its public water supply. This location was supported by the following facts:

1. Permit issued by the U.S. Army Corps of Engineers, Detroit District.
2. Permit for construction, without any qualifications, issued by the Michigan Department of Health.
3. The new line was designed, constructed and

located to assure its source of water would be from the main ship channel. The quality of these waters was substantiated further by the data from the following surveys:

a. U. S. PUBLIC HEALTH SERVICE
Environmental Health Center
SPECIAL STUDIES-U.S. Hopper Dredge SAVANNAH Operations-Detroit River: June-August 1948 Item 2 of the conclusions of the report is as follows and we quote: "The dumping of Rouge River dredged materials in the Detroit River at the head of Fighting Island constitutes an extension of pollution to a relatively unpolluted area of the Detroit River.

b. The report of the International Joint Commission, United States and Canada, on the Pollution of Boundary Waters, 1951.
The data in this report from the 1946-1948 survey show the waters at Detroit Range 14.6-W at 2000 feet from the American shore to have a coliform MPN median value of 2400 per 100 milliliters. This range is about 600 feet north of the present intake crib location.

Further, it was expected that due recognition would be given to the fact that the Detroit River is a boundary water, under the jurisdiction of the International Joint Commission as outlined by the International Waters Treaty of 1909; and that adequate protection would be provided for the use of boundary waters for domestic purposes as specifically outlined in ARTICLE VIII of the treaty.

Furthermore, it was expected that upon acceptance of the findings, remedial measures, and conclusions of the 1951 International Joint Commission report on the pollution of Boundary waters, these waters would retain their good qualities, and gradually proceed to improve towards a better quality.

The letters and reports filed with the various agencies concerned, with respect to sewage pollution at our new intake source, have been many over the years. We believe the following review will serve the purpose at this time:-

AUGUST 31, 1953

The City of Wyandotte received a letter from the Technical Advisory Board to the International Joint Commission under the above date, requesting full information on the progress being made to meet the objectives outlined in Boundary Waters Quality Control. Also full information with respect to taste and odor problems in the city water that would be attributable to pollutants in the raw water. As requested, a report was presented in complete detail, at its regular scheduled meeting held on September 18, 1953 in Windsor, Ontario, Canada.

MARCH 20, 1958

A letter was forwarded to the Sewage Division of the Michigan Department of Health expressing our concern with the increasing degree of sewage pollution in raw water quality. Complete data with respect to the MPN index values for the years 1951 to 1957 inclusive, and the first two months of 1958 were attached to the letter. Information was requested relative to measures in effect, or contemplated, that might reduce this gross pollution and its potential health hazard to a rightful level. On May 2, 1958 and May 28, 1958 a request was made for a response to our letter of March 20, 1958. On June 2, 1958 a response was received. This letter stated that the problem was being studied, and that they were trying to arrive at a statistically sound conclusion, and that we would be advised of their opinion at a later date.

OCTOBER 21, 1958

A complete report was filed with the Water Resources Commission on the State of Michigan with respect to the degree of sewage pollution in the raw water supply. Our letter asked that an investigation be made of this pollution, that controls be provided for the reduction in the degree of sewage pollution, and that the degree of protection be in accord with the specific objectives as outlined by the International Joint Commission. On November 14, 1958 additional information was forwarded to the Water Resources Commission as requested and pertinent to our letter of October 21.

FEBRUARY 6, 1959

A meeting was held in Lansing, Michigan, at the offices of the Water Resources Commission, with city representatives and the staff members of the Commission. At this time, the staff outlined the program for sewage pollution control in the Detroit River. The final report of this meeting states that an improvement in the sanitary quality of the city's intake would be noticeable in 1961.

AUGUST 26, 1959

A letter to which was attached a detailed report on the degree of sewage pollution in our raw water source, was presented to the Technical Advisory Board to the International Joint Commission on Control of Pollution of Boundary Waters at its regular scheduled meeting held in Albany, New York on the above date.

This letter advised the Board that the city was not aware of any work having been done, or being done, for pollution control in the lower Detroit River. The Board was requested to consider the data presented and substantiate it, if necessary. If all was found to be in proper order, it was requested that there be set in motion the required procedures to provide adequate protection for the source of domestic supply for the city of Wyandotte. It was also asked that should we be in error in our interpretation of the protection available to us under Boundary Water Pollution Control, as outlined by the International Joint Commission, we would be pleased to be so informed.

Today, two years and seven months since the presentation of the letter and report, it still is unanswered.

MAY 17, 1960

The City Council of the city, in regular session on the above date, passed a resolution with specific reference to pollution in the Detroit River. In brief it asked that the Detroit office of the Public Health Service increase its activities in the matter of pollution control in the Detroit River, that pollution enforcement agencies in the state of Michigan increase their vigilance in the matter of enforcement to insure the speedy attainment of IJC objectives. Copies of the resolution were forwarded to the following:

International Joint Commission
Michigan Department of Health
Water Resources Commission
Mr. Arthur Flemming, Secretary-Health,
Education and Welfare

On November 22, 1961 a letter was sent to Mr. Abraham Ribicoff, Secretary of Health, Education and Welfare, Washington, D.C. This letter expressed our views and comments on the pollution problem in the Detroit River. Copies of the letter were sent to the following:

Governor J. B. Swainson, State of Michigan
International Joint Commission
State of Michigan-Representatives in
Congress and Senate

Monthly reports, as required by regulations, are filed with the Michigan Department of Health. These contain data relative to daily operations, such as total water pumpage, dosage of all chemicals applied in treatment, physical and chemical analyses, and the results of bacteriological analyses on both raw and finished waters.

Although the recommendation of the International Joint Commission report with respect to the establishment and operation of a local office for continuing supervision over boundary waters pollution had been complied with, little or no work had been done in the lower Detroit River. The first occasion of survey work was started after the city filed a report on pollution in our raw water source with the Advisory Board to the International Joint Commission, United States Section, on August 26, 1959.

The International Joint Commission report of 1951 on the pollution of Boundary Waters set forth both general and specific objectives for the protection of the various uses of these waters. The present day status of these objectives apparently can only be concluded to be in the category of "something to be desired, but not to be achieved."

Fourteen years have now passed since the conclusion of the 1946-1948 survey on pollution in the Detroit River by the Public Health Service, and twelve years since our new intake was placed in service. Let's briefly review the data taken from our operating records with specific reference to the degree of sewage pollution in the raw water:-

ANNUAL AVERAGE RAW WATER COLIFORM INDEX

MOST PROBABLE NUMBERS PER 100 ML.

1. The period of January 1, 1955 to December 31, 1958 exceeds the previous period of January 1, 1951 to December 31, 1954 by 44.4%.
2. The period of January 1, 1956 to December 31, 1960 exceeds the previous period of January 1, 1951 to December 31, 1955 by 82.1%.
3. The period of January 1, 1956 to December 31, 1961 exceeds the previous period of Januay 1, 1951 to December 31, 1955 by 126.1%.

Data obtained from the annual reports of the City of Detroit, Department of Water Supply indicate the following:- for the period of July 1, 1952 to June 30, 1958 the annual average of the MPN index per 100 ml. for raw water quality was 79.07.

Our operating records indicate the following: for the period of January 1, 1952 to December 31, 1958 the annual average of the MPN index per 100 ml. for raw water quality was 11,666.

The above data indicates the drastic change in raw water quality between two raw water intakes on the same river less than 15 miles apart.

Further comparison, based on median values are of interest. Quoted below are the percentage figure by which actual median values for the year and month presented exceeds the median value of 2400 per 100 ml. which the International Joint Commission states in its specific objectives should provide adequate protection for water intakes:

| | 1951 | % | 1961 |
|---|---|---|---|
| JANUARY | 358 | | 213 |
| FEBRUARY | 92 | | 288 |
| MARCH | 0 | | 0 |
| APRIL | 0 | | 0 |
| MAY | 92 | | 288 |
| JUNE | 288 | | 1,358 |
| JULY | 288 | | 525 |
| AUGUST | 288 | | 900 |
| SEPTEMBER | 615 | | 1,900 |

| | 1951 | 1961 |
|---|---|---|
| OCTOBER | 79 | 79 |
| NOVEMBER | 0 | 79 |
| DECEMBER | 0 | 0 |

Such a record most certainly does not indicate progress; nor is it one to be proud of; nor is it in keeping with present-day concern about preserving our water resources; it certainly does not give recognition to the fact that the preservation of the public health is of paramount importance; and finally these conditions are permitted to exist in spite of the fact that all sewage pollution must be considered as a potential health hazard.

It is evident that those who are responsible for or permit discharges of raw, partially or inadequately treated sewage to enter the Detroit River exhibit little or no concern as to the effects of these discharges upon the receiving stream, especially with reference to protecting the sources of domestic uses.

A specific incident occurred during the winter of 1955-1956. The coliform MPN count of our raw water began increasing and no immediate cause was apparent at the time. Upon investigation, it was found that on October 27, 1955 the Fairview Sewage pumping station for the City of Detroit was shut down for repairs. This required that approximately 140,000,000 to 200,000,000 gallons per day of raw sewage be diverted directly into the Detroit River. Further investigation revealed that State Health agencies concerned were not aware of, nor had given approval for this discharge of raw sewage.

No emergency measures were provided for to combat the potential health hazard of these discharges, nor was the City of Wyandotte notified. This diversion continued even though a severe ice jam had occurred at the head of the St. Clair River at Port Huron, Michigan, This ice jam resulted in a reduction of water levels and normal water flow was reduced from 180,000 cubic feet per second to about 80,000 cubic feet per second, a loss of flow of 55%. On February 2, 1956 the Fairview pumping station resumed temporary operations due to low water levels. On April 12, 1956 the station was again taken out of service and raw sewage diverted directly to the river. Repairs were completed and sewage pumping station returned to service on May 27, 1956.

On January 14, 1958 the Detroit Sewage treatment plant suspended operations in order that a diver could inspect the effluent outlet on the Detroit river bottom. Our operating records show that the chlorine demand of the raw water at 9:15 AM to be 31# per million gallons, then dropped to a low of 16# per million gallons, and then returned to 31# per million gallons at 9:20 PM. This operation was repeated again on January 15, 1958. At 5:00 AM the chlorine demand of the raw water was 31# per million gallons, then dropped to a low of 13# per million gallons, then returned to 28# per million gallons at 10:15 PM. This data is indicative of the effect of the sewage treatment plant effluent on the chlorine demand of the raw water at our intake.

On April 29, 1958 the Detroit Sewage plant had occasion to discontinue the discharge of the sewage plant effluent into the Detroit River in order to permit the inspection of the effluent outlet on the river bottom. Samples were taken for bacteriological tests to determine the MPN index of raw water every half-hour from 9:00 AM till midnight. The following is indicative of shut-down and start-up of operations;

| | | | |
|---|---|---|---|
| 9:00 AM to 7:30 PM | | | |
| | 8 samples | MPN index per 100 ml..... | 0 |
| | 3 " | " | 360 |
| | 2 " | " | 730 |
| | 5 " | " | 910 |
| | 1 " | " | 2100 |
| | 3 " | " | 2300 |
| 8-9 PM | 3 " | " | 9300 |
| 9:30 | 1 " | " | 110000 |
| 10:00 | 1 " | " | 15000 |
| 10:30 | 1 " | " | 24000 |
| 11:00 | 1 " | " | 4300 |
| 11:30 | 1 " | " | 9300 |
| midnite | 1 " | " | 2300 |
| | 31 samples | | |

On December 19, 1960 the City of Detroit advised us of a breakdown of pumping operations at their Conners Creek station. Pump damage would require about four weeks for repairs and a new station was under construction at the time and would be completed in about four weeks. During this period, it was stated that a volume of raw sewage ranging from 120 to 240 cubic feet per second would be discharged into the Detroit River. We are not aware if permission was granted for this discharge, or if emergency measures were provided for to protect downstream uses.

Our records indicate that we received a total of 50 telephone calls from personnel of the Detroit Sewage Treatment plant, advising us that chlorination at the plant would be suspended for various reasons. The period of suspension of chlorinations ranged from several hours to seven days. These suspensions of chlorination were during the time period of January 1, 1946 to December 31, 1961.

It is about time that adequate protection be provided public water supply sources in the lower Detroit River by means other than a telephone call, whenever upstream contributors of sewage pollution suspend chlorination at treatment plants, or by-pass discharges of raw sewage.

With reference to industrial pollution that produce objectionable taste and odor problems during treatment, it must be acknowledged that considerable progress has been made. However, taste and odor problems have occurred on occasion. A severe condition occurred this year during the entire month of February and the early part of March. A complete report on the varying chlorine demand of the raw water, and the occurrence of tastes and odors in the finished water have been filed with the Detroit Office of the Public Health Service and the Water Resources Commission. Since efficient survey work cannot be done during the winter months, and this is the time that the problem is acute, it is indicated that more adequate controls should be provided at the sources of such discharges known to be the cause of these taste and odor problems.

In 1944 the City of Wyandotte began the use of chlorine dioxide treatment for control of taste and odors due to industrial wastes pollutants in the raw water supply. Approximately $18,355.00 has been spent for this control from the period of January 1, 1951 to December 31, 1961.

For a point of clarification, Mr. Chairman, it is not the total cost but strictly the sodium chlorite used on treatment. I don't know how we can evaluate the time and dollars spent in trying to arrive at an adequate and efficient treatment to prevent the taste and odors from reaching our consumers.

In 1948 the city purchased an automatic chlorine residual chlorine recorder, to provide for more accurate control of pretreatment in the use of chlorine, due to varying chlorine demand of the raw water. This instrument was the first of its kind in the state of Michigan and the first to be used for control purposes with chlorination of raw water. The instrument is equipped with alarm controls, to indicate changes in chlorine demand, and operation is continuously recorded on a chart. The instrument has been effective in controlling taste and odor problems by the use of chlorine and thereby reducing the cost of chlorine dioxide treatment. The savings can be visualized when comparing the cost of nine cents for one pound of chlorine versus the conversion of one pound of sodium chlorite to chlorine dioxide costing 79 cents. The original cost of the instrument was $3,000.00. Presently experimental work is being done with another unit of automatic chlorine residual recording. Upon acceptance, it will be placed into service at a cost of $2,800.00.

An Absolute Light Scattering Photometer has been purchased and is on hand, at a cost of $3,700.00 for use with our new pretreatment facilities now under construction. This instrument will be used in order to assure that water of the highest quality will be supplied our consumers at all times.

The Michigan Department of Health has advised the City of Wyandotte that it should seek a better source of raw water quality, since there are no indications that the present quality of water at our intake would ever improve, and that conditions are indicative that raw water quality would be injured further by increased sewage pollution. Once again the Detroit River as a boundary water under International Treaty, and for which the International Joint Commission has spelled out specific objectives for pollution control to provide adequate protection for domestic uses therein, is looked upon as suitable only for the disposal of industrial wastes and sewage. To this kind of thinking we do not subscribe.

Only three alternatives are available to the City, should it ever consider another source of water supply. A brief review is as follows:

A. At an expense of several million dollars, construct a new intake line under city streets to tie-in to the Wayne County raw water tunnel, whose shore shaft is located in the northern part of the city, about 1.8 miles from the present filter plant. This water would not be desirable since it is contaminated by sulphur water due to leakage of the tunnel under the river. The intake line is also situated in the Detroit River and subject to sewage pollution.

B. At an expense in excess of a million dollars, extend the present intake line from American waters to Canadian waters. Before considering such a project, it would be expected that we would be notified by a responsible agency that the disposal of industrial wastes and sewage in these waters take precedence over domestic uses; and that pollution control agencies at all levels of government cannot control pollution of these waters; and that the waters of the United States section of the lower Detroit

River are no longer available to the citizens of Wyandotte for use as a source of its public water supply.

C. Abandon the present water treatment plant and its facilities and take water from the City of Detroit. This would involve a financial loss, an increase in water rates for our consumers, and a tremendous expenditure of money to reverse the water distribution system. Since the City of Detroit is presently responsible for the greater share of sewage pollution at our intake in the lower Detroit River, such action on our part would be giving consent to continuing the pollution of our public waters. We have no intention of subscribing to such a principle.

The questions at hand to be solved are quite obvious:

1. Can adequate protection be provided for the source of public water supply for the City of Wyandotte?
2. If so, wherein lies the responsibility to provide this adequate protection?

We are fully confident that this Conference, upon review of all the facts, will be fair and just in its decisions. Thank you for the courtesy of our appearing at this conference and presenting our report.

Very truly yours,

CITY OF WYANDOTTE

Department of Municipal Service

/s/ George J. Hazey
Superintendent Water Division

(Applause)

THE CHAIRMAN: Thank you, Mr. Hazey. Are there any questions or comments?

There might be just one that I have for the purpose of clarification. As I recall it, Mr. Kittrell's report indicated that the taste and odor problems in drinking water downstream had disappeared and that your report indicates on occasion you still have some tastes and odor problems.

MR. HAZEY: Mr. Chairman, it is quite difficult to evaluate taste and odor problems. My opinion is when it is suitable for complaining we like to complain. Due to the varying chlorine demand of our water, I think you will agree it is very difficult to pinpoint very troublesome things as to the exact sourse. Unfortunately, the incident that occurred in February and March was not in time to present here. It has been detailed and I thought there was no point in pursuing it.

THE CHAIRMAN: That is correct, and I thought the information you have, without objection from the conferees, will probably take precedence over that statement.

MR. HAZEY: I like to give credit where credit is due.

THE CHAIRMAN: Yes. Thank you.

DR. HEUSTIS: The next statement will be from the City of Estral Beach and Lake Erie Clean-up Committee. Mr. John Chascsa. Do you have a written statement?

MR. CHASCSA: I have several documents, sir.

THE CHAIRMAN: May we have a five minute recess at this point?

(Whereupon a recess was had.)

THE CHAIRMAN: Will you kindly take your seats so we can resume? Mr. Chascsa.

(See Volume II, Part 2 for continuation.)